

# Chemistry



Manish Kumar.

## **CHEMISTRY AT A GLANCE** **ESPECIAL QUESTION BANK FOR PRACTICE** **(NEET)**



Corporate Office : **ALLEN** CAREER INSTITUTE,  
"SANKALP", CP-6, Indra Vihar, Kota (Rajasthan)-324005  
☎ +91-744-5156100 ✉ info@allen.ac.in ● www.allen.ac.in

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## CHEMISTRY AT A GLANCE

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## PHYSICAL CHEMISTRY

### MOLE CONCEPT

- Number of moles of neutrons in 1.8 mL of water is :-  
(1)  $4.8 \times 10^{23}$  (2)  $4.8 \times 10^{22}$   
(3) 0.8 (4) 0.1
- The weight of 350 mL of a diatomic gas at  $0^\circ\text{C}$  and 2 atm pressure is 1 gm. The weight of one atom is :-  
(1)  $\frac{16}{N_A}$  (2)  $\frac{32}{N_A}$  (3)  $16 N_A$  (4)  $32 N_A$
- 10 mL of gaseous hydrocarbon on combustion gives 20 mL of  $\text{CO}_2$  and 30 mL of  $\text{H}_2\text{O}(\text{g})$ . The hydrocarbon is :-  
(1)  $\text{C}_4\text{H}_{10}$  (2)  $\text{C}_2\text{H}_6$  (3)  $\text{C}_4\text{H}_8$  (4)  $\text{C}_3\text{H}_{10}$
- For the reaction  $\text{A} + 2\text{B} \rightarrow \text{C}$ , 5 moles of A and 8 moles of B will produce :-  
(1) 5 moles of C (2) 4 moles of C  
(3) 8 moles of C (4) 13 moles of C
- If the atomic weight of carbon is set at 24 amu, the value of the avogadro constant would be :-  
(1)  $6.022 \times 10^{23}$  (2)  $12.044 \times 10^{23}$   
(3)  $3.011 \times 10^{23}$  (4) none of these
- Boron has two isotopes, B-10 and B-11. The average atomic mass of Boron is found to be 10.80 u. Calculate the percentage abundance of isotopes :-  
(1) 80 (2) 20 (3) 25 (4) 75
- A compound on analysis gave the following results C = 54.54%, H = 9.09% and vapour density of compound = 88. Determine the molecular formula of the compound :-  
(1)  $\text{C}_8\text{H}_{16}\text{O}_4$  (2)  $\text{C}_4\text{H}_{16}\text{O}_8$   
(3)  $\text{C}_2\text{H}_4\text{O}$  (4)  $\text{CH}_4\text{O}_2$
- Two elements X and Y (atomic mass of X = 75 and Y = 16) combine to give a compound having 76% of X. The formula of compound is :-  
(1) XY (2)  $\text{X}_2\text{Y}$  (3)  $\text{X}_2\text{Y}_2$  (4)  $\text{X}_2\text{Y}_3$
- Mass of  $\text{CO}_2$  produced on heating 20g of 40% pure limestone :-  
(1) 8 gm (2) 8.8 gm  
(3) 3.52 gm (4) none of these
- Calculate the amount of 50%  $\text{H}_2\text{SO}_4$  required to decompose 25g of calcium carbonate :-  
(1) 98 gm (2) 49 gm  
(3) 24.5 gm (4) 196 gm
- 8 gm  $\text{H}_2$ , 32 gm  $\text{O}_2$  is allowed to react to form water then which of the following statement is correct ?  
(1)  $\text{O}_2$  is limiting reagent  
(2)  $\text{O}_2$  is reagent in excess  
(3)  $\text{H}_2$  is limiting reagent  
(4) 40 g water is formed
- A compound contain 34% of sulphur, the minimum molecular wt of compound is :-  
(1) 941.76 (2) 944  
(3) 945.27 (4) None
- The maximum number of molecules is present in :-  
(1) 15 L  $\text{H}_2$  gas at STP  
(2) 5 L of  $\text{N}_2$  gas at STP  
(3) 0.5 g  $\text{H}_2$  gas  
(4) 10g of  $\text{O}_2$  gas
- If the weight of metal chloride is x gm containing y gm of metal, the equivalent weight of metal will be :-  
(1)  $\frac{x}{y} \times 35.5$  (2)  $\frac{8(y-x)}{x}$   
(3)  $\frac{y}{x-y} \times 35.5$  (4)  $E = \frac{8(x-y)}{y}$
- Equal masses of  $\text{H}_2$ ,  $\text{N}_2$  and methane taken in a container of volume V at temperature  $27^\circ\text{C}$  in identical conditions. The ratio of volumes of gases  $\text{H}_2$ : $\text{N}_2$ : methane would be :-  
(1) 56 : 4 : 7 (2) 7 : 4 : 56  
(3) 2 : 28 : 16 (4) 8 : 14 : 1
- For the formation of 3.65 g of HCl gas, what volume of hydrogen gas and chlorine gas are required at NTP conditions ?  
(1) 1L, 1L (2) 1.12 L, 2.24 L  
(3) 3.65 L, 1.83 L (4) 1.12L, 1.12 L
- Which of the following has the highest mass ?  
(1) 1 g-atom of C  
(2)  $\frac{1}{2}$  mole of  $\text{CH}_4$   
(3) 10 mL of water  
(4)  $3.011 \times 10^{23}$  atoms of oxygen
- For the complete combustion of 4 litres of CO at NTP, the required volume of  $\text{O}_2$  at NTP is :-  
(1) 4 litres (2) 8 litres  
(3) 2 litres (4) 1 litre

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19. A gas is found to have molecular formula  $(CO)_x$ . Its vapour density is 70, the value of  $x$  must be :-  
(1) 7 (2) 4 (3) 5 (4) 6
20. 1 litre of a hydrocarbon weight as much as one litre of  $CO_2$ . The molecular formula of hydrocarbon is :-  
(1)  $C_2H_2$  (2)  $C_2H_4$  (3)  $C_2H_6$  (4)  $C_3H_8$
21. Four one-litre flasks are separately filled with the gases hydrogen, helium, oxygen and ozone at same room temperature and in the different flasks the ratio of total atoms would be :-  
(1) 1 : 1 : 1 : 1 (2) 1 : 2 : 2 : 3  
(3) 2 : 1 : 2 : 3 (4) 2 : 1 : 3 : 2
22. There are two oxides of sulphur. They contain 50% and 60% of oxygen respective by weights. The weights of sulphur which combine with 1 gm of oxygen in the ratio g :-  
(1) 1 : 1 (2) 2 : 1  
(3) 2 : 3 (4) 3 : 2
23. A gas is found to contain 2.34 gm of nitrogen and 5.34 gm of oxygen simplest formula of the compound is :-  
(1)  $N_2O$  (2)  $NO$   
(3)  $N_2O_3$  (4)  $NO_2$
24. 16 cc of  $CO_2$  are passed over red hot coke. The volume of  $CO$  evolved is :-  
(1) 18 cc (2) 32 cc (3) 16 cc (4) 4 cc
25. 500 ml of a gaseous hydrocarbon when burnt in excess of  $O_2$  gave 2.0 litres of  $CO_2$  and 2.5 litres of water vapours under same conditions. molecular formula of the hydrocarbon is :-  
(1)  $C_4H_8$  (2)  $C_4H_{10}$  (3)  $C_5H_{10}$  (4)  $C_5H_{12}$
26. The total number of ions present in 1 ml of 0.1 M barium nitrate solution is :-  
(1)  $6.02 \times 10^{18}$  (2)  $6.02 \times 10^{19}$   
(3)  $3.0 \times 6.02 \times 10^{19}$  (4)  $3.0 \times 6.02 \times 10^{18}$
27. One gm equivalent of substance present in :-  
(1) 0.25 mole  $O_2$  (2) 0.5 mole of  $O_2$   
(3) 1.00 mole of  $O_2$  (4) 8.00 mole of  $O_2$
28. In a compound  $A_xB_y$  :-  
(1) Mole of A = mole of B = mole of  $A_xB_y$   
(2) eq of A = eq of B = eq of  $A_xB_y$   
(3)  $yx$  mole of A =  $yx$  mole of B =  $(x + y)$  mole of  $A_xB_y$   
(4)  $yx$  mole of A =  $yx$  mole of B
29. How many moles of magnesium phosphate  $Mg_3(PO_4)_2$  will contain 0.25 mole of oxygen atoms ?  
(1)  $2.5 \times 10^{-2}$  (2) 0.02  
(3)  $3.125 \times 10^{-2}$  (4)  $1.25 \times 10^{-2}$
30. 10 g of  $MnO_2$  on reaction with  $HCl$  forms 2.24 L of  $Cl_2(g)$  at NTP, the percentage impurity of  $MnO_2$  is :-  
 $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$   
(1) 87% (2) 25% (3) 33.3% (4) 13 %
31. The number of H-atoms present in 5.6 g urea are  
(1)  $6.02 \times 10^{23}$  (2)  $2.24 \times 10^{23}$   
(3)  $2.24 \times 10^{22}$  (4)  $3.1 \times 10^{22}$
32. How many moles of methane are required to produce 22 g of  $CO_2(g)$  after combustion  
 $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$   
(1) 1 mol (2) 0.5 mol  
(3) 0.25 mol (4) 1.25 mol
33. In a 5.2 molal aqueous solution of methyl alcohol. What will be the mole fraction of methyl alcohol?  
(1) 0.190 (2) 0.086 (3) 0.050 (4) 0.100
34. The isotopic abundance of C-12 and C-14 is 98% and 2% respectively. What would be the number of atoms of C-14 isotope in 12 g carbon sample  
(1)  $1.032 \times 10^{22}$  (2)  $3.01 \times 10^{23}$   
(3)  $5.88 \times 10^{23}$  (4)  $6.02 \times 10^{23}$
35. The volume of air needed for complete combustion of 1 kg carbon at STP is  
(1) 9333.33 litre (2) 933.33 litre  
(3) 93.33 litre (4) 1866.67 litre
36. A compound made of two elements A and B is found to contains 25% A (atomic mass 12.5) and 75% B (atomic mass 37.5). The simplest formula of the the compound is  
(1) AB (2)  $A_2B_2$  (3)  $AB_3$  (4)  $A_3B$
37.  $CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$   
what will be the amount of  $CaCl_2$  when 10g  $CaCO_3$  and 200 mL 0.75 M  $HCl$  is used in the reaction?  
(1) 83.25 g (2) 16.65 g  
(3) 11.1 g (4) 8.325 g
38. A compound is analyzed and found to consist of 50.4% Ce, 15.1 % N and 34.5% O by mass. What is the correct formula for the compound? (Atomic wt. of Ce = 140)  
(1)  $Ce_2(NO_3)_2$  (2)  $Ce_2(NO_3)_3$   
(3)  $Ce(NO_3)_2$  (4)  $Ce(NO_3)_3$

39. What is the mass of oxygen that is required for the complete combustion of 2.8 kg ethylene  
(1) 2.8 kg (2) 6.4 kg (3) 96 kg (4) 9.6 kg
40. The density of water is 1gm/ml what is the volume occupied by 1 molecule of water in mL.  
(1)  $3 \times 10^{-23}$  (2)  $1 \times 10^{-23}$   
(3)  $2 \times 10^{-23}$  (4)  $4 \times 10^{-23}$

### ATOMIC STRUCTURE

41. FM radio broadcasts at 900 KHz. What wavelength does this corresponds to ?  
(1) 333 m (2)  $3.03 \times 10^{-3}$  m  
(3) 330 cm (4) d 3300 m
42. Energy of 1 mole of radio wave photons with a frequency of 909 KHz is :-  
(1)  $6.02 \times 10^{-28}$  J (2)  $3.62 \times 10^{-4}$  J  
(3)  $1.00 \times 10^{-4}$  J (4)  $6.02 \times 10^{-3}$  J
43. The wavelength of a neutron with a translatory kinetic energy equal to KT at 300 K is :-  
(1) 178 pm (2) 200 pm  
(3) 17.8 pm (4) 20.0 pm
44. Frequency of a matter wave its equal to :-  
(1)  $\frac{(KE)}{2h}$  (2)  $\frac{2(KE)}{h}$  (3)  $\frac{(KE)}{h}$  (4)  $\lambda$
45. Ionisation energy of  $\text{He}^+$  is  $19.6 \times 10^{-18}$  J  $\text{atom}^{-1}$ . The energy of first stationary state ( $n = 1$ ) of  $\text{Li}^{+2}$  is :-  
(1)  $4.41 \times 10^{-16}$  J  $\text{atom}^{-1}$   
(2)  $-4.41 \times 10^{-17}$  J  $\text{atom}^{-1}$   
(3)  $-2.20 \times 10^{-15}$  J  $\text{atom}^{-1}$   
(4)  $8.82 \times 10^{-17}$  J  $\text{atom}^{-1}$
46. Kinetic energy of an electron in the second bohr orbit of a hydrogen atom is ( $a_0$  is bohr radius):-  
(1)  $\frac{h^2}{4\pi^2 m a_0^2}$  (2)  $\frac{h^2}{16\pi^2 m a_0^2}$   
(3)  $\frac{h^2}{32\pi^2 m a_0^2}$  (4)  $\frac{h^2}{64\pi^2 m a_0^2}$
47. The potential energy of an electron in the second Bohr's orbit of the  $\text{He}^+$  ion is :-  
(1) -54.4 eV (2) -27.2 eV  
(3) -108.8 eV (4) -13.6 eV
48. If the radius of the first bohr orbit is X, the de broglie wavelegnth of the electron in the third orbit is nearly:-  
(1)  $2\pi X$  (2)  $6\pi X$  (3)  $9X$  (4)  $X/3$

49. According to Bohr's theory, the angular momentum of an electron in 5th orbit is :-  
(1)  $25 \frac{h}{\pi}$  (2)  $1.0 \frac{h}{\pi}$  (3)  $10 \frac{h}{\pi}$  (4)  $2.5 \frac{h}{\pi}$

50. The number of d electrons retained in  $\text{Fe}^{+2}$  (atomic number Fe = 26) ion is :-  
(1) 3 (2) 4 (3) 5 (4) 6
51. Which of the following nuclear reactions will generate an isotope ?  
(1) Neutron particle emission  
(2) Positron emission  
(3)  $\alpha$  particle emission  
(4)  $\beta$  particle emission
52. The wavelength (in nanometer) associated with a proton (mass =  $1.67 \times 10^{-27}$  kg  $\text{atom}^{-1}$ ) at the velocity of  $1.0 \times 10^3$   $\text{ms}^{-1}$  is :-  
(1) 6.032 nm (2) 0.400 nm  
(3) 2.500 nm (4) 4.00 nm
53. How many orbitals are possible for  $n = 3, l = 2$  ?  
(1) 1 (2) 3 (3) 5 (4) 7
54. Which of the following is violating hund's rule:-  
(1) 

1
---

1	1	1
---	---	---

  
(2) 

1
---

1
---

1		
---	--	--

  
(3) 

1
---

1	1	1
---	---	---

  
(4) All
55. In hydrogen atom, the energy of second shell  $e^0$  is :-  
(1)  $-5.44 \times 10^{-19}$  J (2)  $-5.44 \times 10^{-19}$  KJ  
(3)  $-5.44 \times 10^{-19}$  Cal (4)  $-5.44 \times 10^{-19}$  erg
56. 0.5 gm particle has uncertainty of  $2 \times 10^{-5}$  m find the uncertainty in.  
(1)  $3.0 \times 10^{33}$  (2)  $5 \times 10^{-27}$   
(3)  $4 \times 10^{-30}$  (4)  $4 \times 10^{-10}$
57. Which of the following has similar spectrum as that of  $\text{Li}^+$  :-  
(1) H (2)  $\text{Na}^{10+}$   
(3) He (4)  $\text{He}^+$
58. Radius of first bohr's orbit of hydrogen atom is 0.53 Å then the radius of  $3^{\text{rd}}$  bohr orbit is :-  
(1) 0.70 Å (2) 1.59 Å  
(3) 3.18 Å (4) 4.77 Å
59. If  $n=3$  then  $\ell$  has correct value :-  
(1) 0 (2) 1  
(3) 2 (4) All of the above

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60. What will be the ratio of de-broglie wave length of  $e^-$  accelerated with 400 volt and 100 volt :-  
 (1) 1 : 2 (2) 2 : 1  
 (3) 3 : 10 (4) 10 : 3
61. In an atom 2K, 8L, 8M, 2N electrons are present. If  $m = 0, s = 1/2$ , then find no. of  $e^-$  :-  
 (1) 6 (2) 2 (3) 8 (4) 16
62. Which of following has maximum possibility to find  $e^-$  in  $d_{xy}$  orbital :-  
 (1) Along x axis (2) 1 and 2  
 (3) Along z axis (4) 2 and 1  
 (3) Along zx plane 2D  
 (4) At an angle of  $45^\circ$  from z & x axis
63. In bohr's model  $\frac{nh}{2\pi}$  shows :-  
 (1) Momentum (2) Kinetic energy  
 (3) Potential energy (4) Angular momentum
64.  $2P_y$  orbital electron has energy :-  
 (1) more than  $2P_x$  orbital  
 (2) more than  $2P_z$  orbital  
 (3) same as  $2P_x$  and  $2P_z$   
 (4) same as of 2s orbital
65. Angular momentum of orbital of d electron is:-  
 (1)  $\sqrt{3} \frac{h}{2\pi}$  (2)  $\sqrt{6} \frac{h}{2\pi}$   
 (3)  $\frac{h}{\sqrt{2}\pi}$  (4)  $\frac{\sqrt{3}h}{2\pi}$
66. Which has lowest wavelength :-  
 (1) Balmer series (2) Bracket series  
 (3) Humphry series (4) Lyman series
67. Which of the following ion has magnetic moment is 3.87 BM:-  
 (1)  $Ti^{3+}$  (2)  $Sc^+$  (3)  $Ti^+$  (4)  $Mn^{+5}$
68. No of  $e^-$  in 2d orbital are :-  
 (1) 10 (2) 5 (3) 2 (4) zero
69. Which of the following value of quantum is not possible for 4f:-  
 (1)  $n = 4$  (2)  $\ell = 2$   
 (3)  $m = -2$  to  $+2$  (4) all are possible
70. No of spectral line obtained when electron is provided an energy of 11 eV :-  
 (1) 1 (2) 2  
 (3) 3 (4) 6
71. Which of the following sets of quantum number is not possible  
 (1)  $n=3, \ell=+2, m_\ell=0, m_s=+1/2$   
 (2)  $n=3, \ell=0, m_\ell=0, m_s=-1/2$   
 (3)  $n=3, \ell=0, m_\ell=-1, m_s=+1/2$   
 (4)  $n=3, \ell=1, m_\ell=0, m_s=+1/2$
72. The number of radial nodes in 3s and 2p subshells respectively are  
 (1) 2 and 0 (2) 1 and 2  
 (3) 0 and 2 (4) 2 and 1
73. The mass of an electron is  $9.1 \times 10^{-31}$  kg and velocity is  $2.99 \times 10^{10}$  cm  $s^{-1}$ . The wavelength of the electron will be  
 (1) 0.243 Å (2) 0.0243 Å  
 (3) 4.21 Å (4) 0.421 Å
74. For sodium atom number of electrons with  $m = 0$  will be  
 (1) 2 (2) 7 (3) 9 (4) 8
75. How many electrons in an atom can have  $n=3, \ell=1, m=-1$  and  $s = +1/2$   
 (1) 1 (2) 2 (3) 4 (4) 6
76. Arrange the following wavelengths ( $\lambda$ ) of given emission lines of H atoms in increasing order  
 (a)  $n=3 \xrightarrow{\lambda_1} n=1$  (b)  $n=12 \xrightarrow{\lambda_2} n=10$   
 (c)  $n=5 \xrightarrow{\lambda_3} n=3$  (d)  $n=22 \xrightarrow{\lambda_4} n=20$   
 Choose the correct option.  
 (1)  $\lambda_4 < \lambda_1 < \lambda_2 < \lambda_3$  (2)  $\lambda_4 < \lambda_2 < \lambda_3 < \lambda_1$   
 (3)  $\lambda_1 < \lambda_2 < \lambda_3 < \lambda_4$  (4)  $\lambda_1 < \lambda_3 < \lambda_2 < \lambda_4$
77. If ionisation potential of hydrogen atom is 13.6 eV, then ionisation potential of  $He^+$  will be  
 (1) 54.4 eV (2) 6.8 eV  
 (3) 13.6 eV (4) 24.5 eV
78. For which of the following sets of quantum numbers of an electron will have the highest energy?
- | n     | $\ell$ | m  | s      |
|-------|--------|----|--------|
| (1) 3 | 2      | 1  | $-1/2$ |
| (2) 4 | 1      | -1 | $+1/2$ |
| (3) 4 | 3      | -1 | $+1/2$ |
| (4) 5 | 0      | 0  | $-1/2$ |

# CHEMICAL EQUILIBRIUM

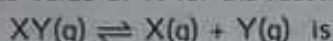
79. By dissociation of 4g mol of  $\text{PCl}_5$  produce 0.8 mol of  $\text{PCl}_3$  if vol of container is 1 litre the equilibrium constant :-

(1) 0.2 (2) 0.1  
(3) 0.4 (4) 1

80. In a system  $\text{P}_{(g)} \rightleftharpoons 2\text{Q}_{(g)} + \text{R}_{(g)}$  at equilibrium is concentration of 'Q' is doubled than how many times the concentration of R at equilibrium will be :-

(1) Double of its original concentration  
(2)  $\frac{1}{4}$  of its original concentration  
(3)  $\frac{1}{2}$  of its original concentration  
(4) 4 times of its original concentration

81. 1 mol of  $\text{XY}_{(g)}$  and 0.2 mol of  $\text{Y}_{(g)}$  are mixed in 1L vessel. At equilibrium 0.6 mol of  $\text{Y}_{(g)}$  is present. The value of K for the reaction :-

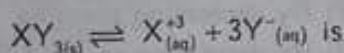


(1) 0.04 (2) 0.06 (3) 0.36 (4) 0.40

82. In which of the following reaction is almost completed :-

(1)  $K = 10$  (2)  $K = 1$   
(3)  $K = 10^3$  (4)  $K = 10^{-2}$

83. If the concentration of  $\text{Y}^-$  ion in the reaction

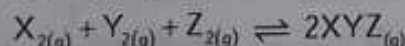


decreased by  $\frac{1}{2}$  times, then equilibrium conc<sup>n</sup>

of  $\text{X}^{+3}$  will increase by :-

(1) 2 times (2) 4 times  
(3) 8 times (4) 16 times

84. Given the reaction b/w 3 gases represented  $\text{X}_2$ ,  $\text{Y}_2$ ,  $\text{Z}_2$  to give the compound  $\text{XYZ}_{(g)}$



At equilibrium conc<sup>n</sup>

of  $\text{X}_2 = 3\text{M}$ ,  $\text{Y}_2 = 6\text{M}$ ,  $\text{Z}_2 = 9\text{M}$   
 $\text{XYZ} = 6\text{M}$

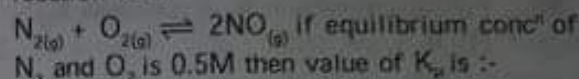
If the reaction take place in a sealed vessel at  $527^\circ\text{C}$ , then the value of  $K_c$  will be :

(1)  $\frac{27}{2}$  (2)  $\frac{2}{9}$  (3) 36 (4) 24

85. A gaseous mixture was prepared by taking 3 mol of  $\text{H}_2$  and 1 mol of  $\text{CO}$ . If the total pressure of the mixture was found 2 atmosphere then partial pressure of hydrogen ( $\text{H}_2$ ) in the mixture is :-

(1)  $\frac{3}{2}$  (2)  $\frac{1}{2}$  (3) 1 (4) 2

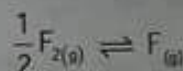
86. The value of  $K_c$  at 900 K temp for following reaction is 5



If equilibrium conc<sup>n</sup> of  $\text{N}_2$  and  $\text{O}_2$  is 0.5M then value of  $K_p$  is :-

(1) 0.02 (2) 0.2  
(3) 5 (4)  $\frac{5}{RT}$

87. The equilibrium constant  $K_c$  for the following reaction at  $842^\circ\text{C}$  is  $7.90 \times 10^{-3}$ . What is  $K_p$  at same temperature ?



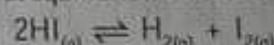
(1)  $8.64 \times 10^{-5}$  (2)  $8.26 \times 10^{-4}$   
(3)  $7.90 \times 10^{-2}$  (4)  $7.56 \times 10^{-2}$

88.  $\text{NH}_4\text{HS}_{(s)} \rightleftharpoons \text{NH}_{3(g)} + \text{H}_2\text{S}_{(g)}$

The equilibrium pressure at  $25^\circ\text{C}$  is 0.660 atm. What is  $K_p$  for reaction ?

$\text{NH}_4\text{HS}_{(s)} \rightleftharpoons \text{NH}_{3(g)} + \text{H}_2\text{S}_{(g)}$   
(1) 0.109 (2) 0.218  
(3) 1.89 (4) 2.18

89. At a certain temperature only 50% HI dissociated at equilibrium in the following reaction



The equilibrium constant for reaction

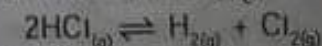
(1) 0.25 (2) 1.0 (3) 3.0 (4) 0.5

90. For the reaction  $\text{CO}_{(g)} + \text{Cl}_{2(g)} \rightleftharpoons \text{COCl}_{2(g)}$  the

value of  $\frac{K_c}{K_p}$  is equal to :-

(1)  $\sqrt{RT}$  (2)  $RT$  (3)  $\frac{1}{RT}$  (4) 1

91. The equilibrium constant ( $K_c$ ) for the reaction



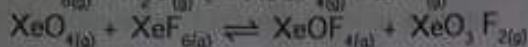
is  $2 \times 10^{-2}$  at  $25^\circ\text{C}$ . What is the equilibrium constant

for the reaction  $\text{H}_{2(g)} + \text{Cl}_{2(g)} \rightleftharpoons 2\text{HCl}_{(g)}$  :-

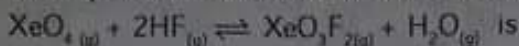
(1)  $2 \times 10^{-2}$  (2) 50  
(3)  $5 \times 10^2$  (4) None of these

Pre-Medical

92. If  $K_1$  and  $K_2$  are the equilibrium constant for the two reactions



The equilibrium constant for the reaction

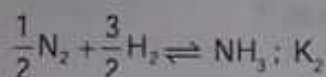
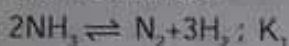


- (1)  $K_1 K_2$  (2)  $K_1/K_2$   
(3)  $K_2/K_1$  (4)  $K_1/K_2$

93. For which reaction  $K_p$  is less than  $K_c$  :-

- (1)  $\text{N}_2\text{O}_4 \rightleftharpoons 2\text{NO}_2$   
(2)  $2\text{HI} \rightleftharpoons \text{H}_2 + \text{I}_2$   
(3)  $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$   
(4)  $\text{N}_2 + \text{O}_2 \rightleftharpoons 2\text{NO}$

94. At  $25^\circ\text{C}$  the equilibrium constant  $K_1$  and  $K_2$  of two reaction are



The relation b/w two equilibrium constant is

- (1)  $K_1 = K_2$  (2)  $K_2 = \frac{1}{K_1}$   
(3)  $K_1 = \frac{1}{K_2}$  (4)  $K_1 = K_2$

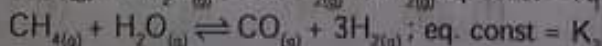
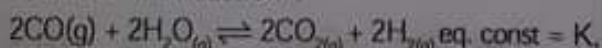
95. For the reaction  $2\text{SO}_3(g) \rightleftharpoons 2\text{SO}_{2(g)} + \text{O}_{2(g)}$  the value of  $\frac{K_c}{K_p}$  will be :-

- (1)  $(RT)^1$  (2)  $(RT)^{-1}$  (3)  $\sqrt{RT}$  (4)  $(RT)^{-2}$

96. For  $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ ;  $\Delta H = -ve$  then :-

- (1)  $K_p = K_c$   
(2)  $K_p = K_c RT$   
(3)  $K_p = K_c (RT)^{-2}$   
(4)  $K_p = K_c (RT)^{-1}$

97. Consider the reaction :-



Which of the following relation is correct ?

- (1)  $K_3 = \frac{K_1}{K_2}$  (2)  $K_3 = \frac{K_1^2}{K_2^2}$   
(3)  $K_3 = K_1 K_2$  (4)  $K_3 = \sqrt{K_1} \cdot K_2$

98. One mole of  $\text{X}_2$  is mixed with one mole of  $\text{Y}_2$  in a flask of volume 1 litre. If at equilibrium 0.5 mole of  $\text{Y}_2$  are obtained. Then find out  $K_p$  for reaction  $\text{X}_{2(g)} + \text{Y}_{2(g)} \rightleftharpoons 2\text{XY}_{(g)}$

- (1) 12 (2) 9 (3) 4 (4) 36

99. For the reaction  $2\text{NO}_{2(g)} + \frac{1}{2}\text{O}_{2(g)} \rightleftharpoons \text{N}_2\text{O}_{5(g)}$  if the equilibrium constant is  $K_p$ , then the equilibrium constant for the reaction  $2\text{N}_2\text{O}_{5(g)} \rightleftharpoons 4\text{NO}_{2(g)} + \text{O}_{2(g)}$  would be :-

- (1)  $K_p^2$  (2)  $\frac{2}{K_p}$  (3)  $\frac{1}{K_p^2}$  (4)  $\frac{1}{\sqrt{K_p}}$

100. In the rxn  $\text{X}_{(g)} + \text{Y}_{(g)} \rightleftharpoons 2\text{Z}_{(g)}$  2 mol of X, 1 mol of Y and 1 mol of Z are placed in a 10 litre vessel and allowed to reach equilibrium. If final conc<sup>n</sup> of Z is 0.2M, then  $K_c$  for the given reaction is :-

- (1) 1.6 (2) 80/3  
(3) 16/3 (4) None of these

101. For the reversible reaction



The equilibrium will shift in forward direction:-

- (1) By increasing conc of  $\text{PCl}_{5(g)}$   
(2) By decreasing pressure  
(3) By decreasing conc<sup>n</sup> of  $\text{PCl}_{3(g)}$  and  $\text{Cl}_{2(g)}$   
(4) By increasing pressure and decreasing temp

102. For a given endothermic rxn,  $K_p$  and  $K_p'$  are the equilibrium constant at temp  $T_1$  and  $T_2$  respectively. Assuming the heat of reaction is constant in temp. range b/w  $T_1$  and  $T_2$ , it is readily observed that  $T_2 > T_1$  :-

- (1)  $K_p > K_p'$  (2)  $K_p < K_p'$

- (3)  $K_p = K_p'$  (4)  $K_p = \frac{1}{K_p'}$

103. Which reaction give more product as a result of increase in pressure :-

- (1)  $\text{H}_2\text{O} + \text{CO} \rightleftharpoons \text{H}_2 + \text{CO}_2$   
(2)  $\text{H}_2 + \text{Br}_2 \rightleftharpoons 2\text{HBr}$   
(3)  $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$   
(4)  $2\text{HI} \rightleftharpoons \text{H}_2 + \text{I}_2$

104. The equilibrium constant for the following reaction is 10 at 500 K. A system at equilibrium has  $[CO] = 0.25$  M and  $[H_2] = 1$  M. What is the  $[CH_3OH]$ ?
- $$CO_{(g)} + 2H_{2(g)} \rightleftharpoons CH_3OH_{(g)}$$
- (1) 0.25 (2) 2.5 (3) 5 (4) 10
105. At certain temp. compound  $AB_{2(g)}$  dissociate according to reaction  $AB_{2(g)} \rightleftharpoons AB_{(g)} + B_{(g)}$  with degree of dissociation  $\alpha$ , which is small compared with unity. The expression of  $K_p$  in terms of  $\alpha$  and initial pressure  $P$  is :-
- (1)  $P\alpha^3$  (2)  $P\alpha^2$   
(3)  $\frac{\alpha^3}{P}$  (4)  $\frac{\alpha^2}{P}$
106. For which of the following reaction is product formation favoured by low pressure and high temperature
- (1)  $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)} \quad \Delta H^\circ = -9.4 \text{ KJ}$   
(2)  $CO_{2(g)} + C_{(s)} \rightleftharpoons 2CO_{(g)} \quad \Delta H^\circ = 172.5 \text{ KJ}$   
(3)  $CO_{(g)} + 2H_{2(g)} \rightleftharpoons CH_3OH_{(g)} \quad \Delta H^\circ = -21.7 \text{ KJ}$   
(4)  $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)} \quad \Delta H^\circ = 285 \text{ KJ}$
107. For which reaction  $K_p = K_c$ :-
- (1)  $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$   
(2)  $2NOCl_{(g)} \rightleftharpoons 2NO_{(g)} + Cl_{2(g)}$   
(3)  $I_{2(g)} + H_{2(g)} \rightleftharpoons 2HI_{(g)}$   
(4) None of these
108. For the reaction
- $$CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$$
- at a given temperature the equilibrium amount of  $CO_2(g)$  can be increased by
- (1) adding suitable catalyst  
(2) adding inert gas  
(3) decreasing the volume of container  
(4) increasing the amount of  $CO(g)$
109. The equilibrium constant for the reaction
- $$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$$
- is  $4 \times 10^{-4}$  at 200 K. In presence of a catalyst equilibrium is attained ten times faster. Therefore, the equilibrium constant in presence of the catalyst at 200 K is
- (1)  $40 \times 10^{-4}$   
(2)  $4 \times 10^{-4}$   
(3)  $4 \times 10^{-3}$   
(4) difficult to compute without more data
110.  $NH_4COONH_4(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$   
If equilibrium pressure is 3 atm for the above reaction  $K_p$  will be  
(1) 4 (2) 27 (3) 4/27 (4) 1/27
111. 1 mole of  $H_2$  and 2 mole of  $I_2$  are taken initially in a 2L vessel. The number of moles of  $H_2$  at equilibrium is 0.2 then, the number of moles of  $I_2$  and  $HI$  at equilibrium are  
(1) 1.2, 1.6 (2) 1.8, 1.0  
(3) 0.4, 2.4 (4) 0.8, 2.0
112. In a vessel of 5L, 26 moles of A and 4 moles of B were placed. At equilibrium 1 mole of C was present. The  $K_c$  for the reaction :  
 $A + 2B \rightleftharpoons C$  is  
(1) 0.25 (2) 0.50 (3) 2.5 (4) 4.8
113. Consider the following gaseous equilibrium with equilibrium constant  $K_1$  and  $K_2$  respectively
- $$SO_2(g) + \frac{1}{2} O_2(g) \rightleftharpoons SO_3(g)$$
- $$2SO_3(g) \rightleftharpoons 2SO_2(g) + O_2(g)$$
- The equilibrium constants are related as
- (1)  $2K_1 = K_2^2$  (2)  $K_1^2 = \frac{1}{K_2}$   
(3)  $K_2^2 = \frac{1}{K_1}$  (4)  $K_2 = \frac{2}{K_1^2}$
114. Out of the following one which is correct for equilibrium state?  
(a)  $\Delta G = 0$  (b)  $\Delta S = 0$  (c)  $r_f = r_b$  (d)  $E_{cell} = 0$   
(1) a, b (2) only b (3) a, c & d (4) only c
115. For a reaction  $SO_{2(g)} + \frac{1}{2} O_{2(g)} \rightleftharpoons SO_{3(g)}$   
The value of  $\frac{K_p}{K_c}$  is equal to  
(1) 1 (2) RT (3)  $(RT)^{1/2}$  (4)  $(RT)^{-1/2}$
116. For the reaction  $N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$  the degree of dissociation is 0.2 at equilibrium and 1 atm pressure then equilibrium constant  $K_p$  will be  
(1)  $\frac{1}{2}$  (2)  $\frac{1}{4}$  (3)  $\frac{1}{6}$  (4)  $\frac{1}{8}$
117. One mole of X and Y are allowed to react in a 2L container when equilibrium is reached the following reaction occurs  $2X + Y \rightleftharpoons Z$ . If the concentration of Z is 0.2M calculate the equilibrium constant for this reaction  
(1) 0.015 (2) 2.22  
(3) 6.70 (4) 66.7

118. 28g  $N_2$  and 6g  $H_2$  were mixed. At equilibrium 17g  $NH_3$  was formed. The mass of  $N_2$  and  $H_2$  at equilibrium are respectively  
 (1) 11g, zero (2) 1g, 3g  
 (3) 14g, 3g (4) 11g, 3g
119. For the reaction  $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ , the equilibrium constant will change with  
 (1) total pressure  
 (2) catalyst  
 (3) concentration of  $H_2$  and  $I_2$   
 (4) temperature

### IONIC EQUILIBRIUM

120. What is the  $K_b$  of weak base that produce one  $OH^-$  ion if a 0.05 M solution is 2.5% ionised?  
 (1)  $7.8 \times 10^{-8}$  (2)  $1.6 \times 10^{-6}$   
 (3)  $3.1 \times 10^{-5}$  (4)  $1.2 \times 10^{-3}$
121. Solubility of calcium phosphate (molecular mass, M) in water is w g per 100 ml at  $25^\circ C$ , its solubility product at  $25^\circ C$  will be approximately :-  
 (1)  $10^9 \left(\frac{w}{M}\right)^5$  (2)  $10^7 \left(\frac{w}{M}\right)^5$   
 (3)  $10^5 \left(\frac{w}{M}\right)^5$  (4)  $10^3 \left(\frac{w}{M}\right)^5$
122. 0.2 gm sample of benzoic acid  $C_6H_5COOH$  is titrated with 0.12 M  $Ba(OH)_2$  solution, what volume of  $Ba(OH)_2$  solution is required to reach the equivalent point?  
 (1) 6.83 ml (2) 13.6 ml  
 (3) 17.6 ml (4) 35.2 ml
123. The  $K_{sp}$  of  $Ag_2CrO_4$  is  $1.1 \times 10^{-12}$  at 298 K, solubility in (mol/L) of  $Ag_2CrO_4$  in 0.1M  $AgNO_3$  solution is :-  
 (1)  $1.1 \times 10^{-11}$  (2)  $1.1 \times 10^{-10}$   
 (3)  $1.1 \times 10^{-12}$  (4)  $1.1 \times 10^{-9}$
124. For a sparingly soluble salt  $A_pB_q$ , the relation of its solubility product ( $L_s$ ) with its solubility (S) is :-  
 (1)  $L_s = S^{p+q}$ ,  $P^p, q^q$  (2)  $L_s = S^{p+q} P^q, q^p$   
 (3)  $L_s = S^{p+q}$ ,  $P^p, q^q$  (4)  $L_s = S^{p+q}$ ,  $(Pq)^{p+q}$
125. The degree of dissociation of water at  $25^\circ C$  is  $1.9 \times 10^{-7}\%$  and density  $1.0 \text{ gm/cm}^3$ , the ionisation constant of water is :-  
 (1)  $1.0 \times 10^{-15}$  (2)  $1.0 \times 10^{-14}$   
 (3)  $1.0 \times 10^{-16}$  (4)  $1.0 \times 10^{-6}$

126. A certain weak acid has a dissociation constant  $1.0 \times 10^{-4}$ , the equilibrium constant for its reaction with strong base is :-  
 (1)  $1.0 \times 10^{-4}$  (2)  $1.0 \times 10^{-10}$   
 (3)  $1.0 \times 10^{10}$  (4)  $1.0 \times 10^{14}$
127. A certain buffer solution contain equal concentration of  $X^-$  and  $HX$ . The  $K_a$  for  $X^-$  is  $10^{-10}$  the pH of the buffer is :-  
 (1) 4 (2) 9 (3) 10 (4) 7
128. Find the pH of a solution prepared by mixing 25 ml of a 0.5M solution of  $HCl$ , 10 ml of a 0.5 M solution of  $NaOH$  and 15 ml of water :-  
 (1) 4 (2) 3 (3) 0.82 (4) 0.10
129. Calculate the pH of a  $10^{-3}M$  solution of  $Ba(OH)_2$  if it undergoes complete ionisation ( $K_w = 1 \times 10^{-14}$ ) :-  
 (1) 12.30 (2) 11.30  
 (3) 10.00 (4) 9.00
130. 0.01 mole of sodium hydroxide is added to 10 litres of water, How will the pH of water change?  
 (1) 4 (2) 7 (3) 5 (4) 8
131. The degree of dissociation of acetic acid in a 0.1 M solution is  $1.32 \times 10^{-2}$ , find out the  $pK_a$  :-  
 (1) 5.75 (2) 3.75  
 (3) 4.00 (4) 4.75
132. Calculate the pH of a  $10^{-5}M$   $HCl$  solution if 1ml of it is diluted to 1000 ml,  $k_w = 1 \times 10^{-14}$  :-  
 (1) 7.98 (2) 6.98  
 (3) 7.00 (4) 5
133. Calculate the degree of hydrolysis of the 0.01 M solution of salt (KF) ( $K_a(HF) = 6.6 \times 10^{-4}$ ) :-  
 (1)  $3.87 \times 10^{-6}$   
 (2)  $3.87 \times 10^{-5}$   
 (3)  $3.87 \times 10^{-2}$   
 (4) None of these
134. For poly basic acid, the dissociation constant have a different values for each step.  
 $H_3A \rightleftharpoons H^+ + H_2A$ ;  $K_{eq} = K_{a1}$   
 $H_2A \rightleftharpoons H^+ + HA^-$ ;  $K_{eq} = K_{a2}$   
 $HA^- \rightleftharpoons H^+ + A^{2-}$ ;  $K_{eq} = K_{a3}$   
 What is the observed trend of dissociation constant in successive stages?  
 (1)  $K_{a1} > K_{a2} > K_{a3}$  (2)  $K_{a1} = K_{a2} = K_{a3}$   
 (3)  $K_{a1} < K_{a2} < K_{a3}$  (4)  $K_{a1} = K_{a2} + K_{a3}$

135. Equimolar solutions of HF, HCOOH and HCN at 298 K have the values of  $K_a$  as  $6.8 \times 10^{-4}$ ,  $1.8 \times 10^{-4}$  and  $4.8 \times 10^{-9}$  respectively, what will be the order of their acidic strength ?  
 (1) HF > HCN > HCOOH  
 (2) HF > HCOOH > HCN  
 (3) HCN > HF > HCOOH  
 (4) HCOOH > HCN > HF
136.  $\text{NH}_4\text{CN}$  is a salt of weak acid HCN ( $K_a = 6.2 \times 10^{-10}$ ) and a weak base  $\text{NH}_4\text{OH}$  ( $K_b = 1.8 \times 10^{-5}$ ). A one molar solution of  $\text{NH}_4\text{CN}$  will be :-  
 (1) Neutral (2) Strongly acidic  
 (3) Strongly basic (4) Weakly basic
137. The solubility product of  $\text{BaCl}_2$  is  $4 \times 10^{-9}$ . What will be its solubility in mol/L :-  
 (1)  $4 \times 10^{-3}$  (2)  $3.2 \times 10^{-9}$   
 (3)  $10^{-3}$  (4)  $1 \times 10^{-9}$
138. Dissociation constant of  $\text{CH}_3\text{COOH}$  and  $\text{NH}_4\text{OH}$  in aqueous solution are  $10^{-5}$  if pH of a  $\text{CH}_3\text{COOH}$  solution is 3, what will be the pH of  $\text{NH}_4\text{OH}$  ?  
 (1) 3.0 (2) 4.0  
 (3) 10.0 (4) 11.0
139. What is the minimum concentration of  $\text{SO}_4^{2-}$  required to precipitate  $\text{BaSO}_4$  in a solution containing  $1 \times 10^{-4} \frac{\text{mole}}{\text{L}}$  of  $\text{Ba}^{2+}$  ( $K_{sp}$  of  $\text{BaSO}_4 = 4 \times 10^{-10}$ ) :-  
 (1)  $4 \times 10^{-10} \text{ M}$  (2)  $2 \times 10^{-10} \text{ M}$   
 (3)  $4 \times 10^{-6} \text{ M}$  (4)  $2 \times 10^{-3} \text{ M}$
140. The solubility product of  $\text{AgCl}$  is  $1.5625 \times 10^{-10}$  at  $25^\circ\text{C}$  its solubility in grams per litre will be :-  
 (1) 143.5 (2) 108  
 (3)  $1.57 \times 10^{-8}$  (4)  $1.79 \times 10^{-3}$
141. Solubility product of radium sulphate is  $4 \times 10^{-11}$ . What will be the solubility of  $\text{Ra}^{2+}$  in  $0.10 \text{ M Na}_2\text{SO}_4$  ?  
 (1)  $4 \times 10^{-10}$  (2)  $2 \times 10^{-5} \text{ M}$   
 (3)  $4 \times 10^{-5} \text{ M}$  (4)  $2 \times 10^{-10} \text{ M}$
142. Which of the following species can act as an acid as well as a base ?  
 (1)  $\text{SO}_4^{2-}$  (2)  $\text{HSO}_4^-$   
 (3)  $\text{PO}_4^{3-}$  (4)  $\text{OH}^-$
143. Which of the following salts will give basic solution on hydrolysis ?  
 (1)  $\text{NH}_4\text{Cl}$  (2)  $\text{KCl}$   
 (3)  $\text{K}_2\text{CO}_3$  (4)  $(\text{NH}_4)_2\text{CO}_3$
144. In which of the following solvents silver chloride easily soluble ?  
 (1)  $0.1 \frac{\text{mol}}{\text{dm}^3} \text{ AgNO}_3$  solution  
 (2)  $0.1 \frac{\text{mol}}{\text{dm}^3} \text{ HCl}$  solution  
 (3)  $\text{H}_2\text{O}$   
 (4) Aqueous  $\text{NH}_3$
145. pH of  $10^{-6} \text{ M HCl (aq.)}$  is :-  
 (1) just less than 6 (2) exactly equal to 6  
 (3) just greater than 6 (4) just less than 7
146. How much water must be added to 300 mL of 0.2M solution of  $\text{CH}_3\text{COOH}$  ( $K_a = 1.8 \times 10^{-5}$ ) for the degree of dissociation to double ?  
 (1) 600 ml (2) 900 ml  
 (3) 1200 ml (4) 1500 ml
147. Selenious acid ( $\text{H}_2\text{SeO}_3$ ), a diprotic acid has  $K_{a1} = 10^{-5}$  and  $K_{a2} = 10^{-8}$  respectively. Approximate pH of  $0.01 \text{ M NaHSeO}_3$  is given by :-  
 (1)  $\text{pH} = 7 + \frac{\text{p}K_{a1}}{2} + \frac{\log C}{2}$   
 (2)  $\text{pH} = 7 - \frac{\text{p}K_{a1}}{2} - \frac{\log C}{2}$   
 (3)  $\text{pH} = \frac{\text{p}K_{a1} + \text{p}K_{a2}}{2}$   
 (4)  $\text{pH} = 7 + \frac{\text{p}K_{a1}}{2} - \frac{\text{p}K_{a2}}{2}$
148. Which of the following would increase the solubility of  $\text{Pb(OH)}_2$  :-  
 (1) Add  $\text{HCl}$  solution  
 (2) Add  $\text{Pb(NO}_3)_2$  solution  
 (3) Add  $\text{NaOH}$  solution  
 (4) Solubility depends on temperature only
149. Solubility of  $\text{AgCl}$  in  $0.2 \text{ M NaCl}$  is  $x$  and that in  $0.1 \text{ M AgNO}_3$  is  $y$ . Then which of the following is correct ?  
 (1)  $x = y$  (2)  $x > y$   
 (3)  $x < y$  (4) Data insufficient

## Pre-Medical

150. What is the pH of saturated solution of  $\text{Cu}(\text{OH})_2$ ? ( $K_{sp} = 3.2 \times 10^{-20}$ )  
 (1) 6.4 (2) 7.6 (3) 7.3 (4) 7.9
151. An acid base indicator has  $K_{\text{ind}} = 3.0 \times 10^{-5}$ . The acid form of the indicator is red and the basic form is blue the change in  $(\text{H}^+)$  required to change the indicator from 75% red to 75% blue is :-  
 (1)  $8 \times 10^{-5} \text{ M}$  (2)  $9 \times 10^{-5} \text{ M}$   
 (3)  $10^{-5} \text{ M}$  (4)  $3 \times 10^{-4} \text{ M}$
152.  $\text{pK}_a$  of  $\text{NH}_4^+$  is 9.26. Hence effective pH range for  $\text{NH}_4\text{OH} - \text{NH}_4\text{Cl}$  buffer is :-  
 (1) 8.26 to 10.26 (2) 4.74 to 5.74  
 (3) 3.74 to 5.74 (4) 8.26 to 9.26
153. The pH of a solution of 0.10M  $\text{CH}_3\text{COOH}$  increases when which of the following substances is added ?  
 (1)  $\text{NaHSO}_4$  (2)  $\text{HClO}_4$   
 (3)  $\text{KNO}_3$  (4)  $\text{K}_2\text{CO}_3$
154.  $\text{H}_2\text{CO}_3$  and  $\text{NaHCO}_3$  constitute buffer system in blood and maintain its pH close to 7.4. An excess of acid entering the blood stream is removed by :-  
 (1)  $\text{HCO}_3^-$  (2)  $\text{H}_2\text{CO}_3$   
 (3)  $\text{H}^+$  (4)  $\text{CO}_3^{2-}$
155. The  $\text{pK}_a$  for acid A is greater than  $\text{pK}_a$  for acid B, the strong acid is :-  
 (1) B (2) A  
 (3) Both A and B (4) None of these
156. What is expression for  $K_{sp}$  for  $\text{PbCl}_2$ ?  
 (1)  $[\text{Pb}^{2+}] [\text{Cl}^-]^2$  (2)  $[\text{Pb}^{2+}] / [\text{Cl}^-]^2$   
 (3)  $[\text{Pb}^{2+}] [\text{Cl}^-]^2$  (4)  $[\text{Pb}^{2+}] / [\text{Cl}^-]^2$
157. What is the  $[\text{OH}^-]$  in final solution prepared by mixing 20 ml of 0.050 M  $\text{HCl}$  with 30 ml of 0.10 M  $\text{Ba}(\text{OH})_2$ ?  
 (1) 0.10 M (2) 0.40 M  
 (3) 0.0050 M (4) 0.12 M
158. At  $25^\circ\text{C}$ , the solubility product of  $\text{Hg}_2\text{Cl}_2$  in water is  $3.2 \times 10^{-17} \text{ mol}^3 \text{ dm}^{-9}$  what is the solubility of  $\text{Hg}_2\text{Cl}_2$  in water at  $25^\circ\text{C}$ ?  
 (1)  $1.2 \times 10^{-12} \text{ M}$   
 (2)  $3.0 \times 10^{-5} \text{ M}$   
 (3)  $2 \times 10^{-6} \text{ M}$   
 (4)  $1.2 \times 10^{-16} \text{ M}$
159. When a buffer solution of  $\text{CH}_3\text{COOH}$  and  $\text{CH}_3\text{COONa}$  is diluted with water  
 (1)  $\text{CH}_3\text{COO}^-$  ion concentration increases  
 (2)  $\text{H}^+$  ion concentration increases  
 (3)  $\text{OH}^-$  ion concentration increases  
 (4)  $\text{H}^+$  ion concentration does not change
160. The solubility products of  $\text{AgCl}$  &  $\text{AgI}$  are  $1.1 \times 10^{-10}$  and  $1.6 \times 10^{-16}$  respectively. If  $\text{AgNO}_3$  is added drop by drop to the solution containing both chloride and iodide ions. The salt which will precipitate first?  
 (1)  $\text{AgI}$   
 (2)  $\text{AgNO}_3$   
 (3)  $\text{AgCl}$   
 (4) both  $\text{AgCl}$  and  $\text{AgI}$  simultaneously
161. In the hydrolysis equilibrium  
 $\text{B}^+ + \text{H}_2\text{O} \rightleftharpoons \text{BOH} + \text{H}^+$ ,  $K_b = 1 \times 10^{-5}$   
 The hydrolysis constant is  
 (1)  $10^{-5}$  (2)  $10^{-10}$  (3)  $10^{-10}$  (4)  $10^{-5}$
162. Which one of the following is an acidic salt  
 (1)  $\text{Na}_2\text{HPO}_4$  (2)  $\text{NH}_4\text{NO}_3$   
 (3)  $\text{NaH}_2\text{PO}_4$  (4)  $\text{NaHCO}_3$
163. Which of the is the conjugate base of  $\text{OH}^-$   
 (1)  $\text{O}^{2-}$  (2)  $\text{O}^-$  (3)  $\text{H}_2\text{O}$  (4)  $\text{O}_2$
164.  $\text{CH}_3\text{NH}_2$  (0.1 mole,  $K_b = 5 \times 10^{-4}$ ) is added to 0.08 moles of  $\text{HCl}$  and the solution is diluted to one litre. The resulting hydrogen ion concentration is  
 (1)  $1.6 \times 10^{-11}$  (2)  $8 \times 10^{-11}$   
 (3)  $5 \times 10^{-5}$  (4)  $8 \times 10^{-2}$
165. If  $\text{Na}_2\text{CO}_3$  is added to the solution of  $\text{H}_2\text{CO}_3$ , the pH of  $\text{H}_2\text{CO}_3$  solution  
 (1) decreases (2) remains constant  
 (3) increases (4) cannot be predicted
166. Calculate the pH of a solution containing 0.1 M  $\text{CH}_3\text{COOH}$  and 0.15 M  $\text{CH}_3\text{COO}^-$ . ( $K_a$  of  $\text{CH}_3\text{COOH} = 1.8 \times 10^{-5}$ )  
 (1) 9.1 (2) 3.9 (3) 10. (4) 4.91
167. In a saturated aqueous solution of  $\text{AgBr}$ , concentration of  $\text{Ag}^+$  ion is  $1 \times 10^{-6} \text{ mol L}^{-1}$  if  $K_{sp}$  for  $\text{AgBr}$  is  $4 \times 10^{-13}$ , then concentration of  $\text{Br}^-$  in the solution is  
 (1)  $1 \times 10^{-6} \text{ mol L}^{-1}$  (2)  $4 \times 10^{-6} \text{ mol L}^{-1}$   
 (3)  $4 \times 10^{-7} \text{ mol L}^{-1}$  (4)  $4 \times 10^{-19} \text{ mol L}^{-1}$
168. A solution of an acid has  $\text{pH} = 4.70$ . Find out the concentration of  $\text{OH}^-$  ion ( $\text{pK}_w = 14$ )  
 (1)  $5 \times 10^{-10}$  (2)  $6 \times 10^{-10}$   
 (3)  $2 \times 10^{-6}$  (4)  $9 \times 10^{-6}$

169. Which of the following is not an example of buffer solution?  
 (1)  $\text{HNO}_2 + \text{KNO}_2$   
 (2)  $\text{HF} + \text{KF}$   
 (3)  $\text{PhNH}_2 + \text{PhNH}_3^+\text{Cl}^-$   
 (4)  $\text{NH}_4\text{Cl} + \text{HCl}$
170. Which of the following acid will release maximum amount of heat when completely neutralizes by strong base  $\text{NaOH}$ ?  
 (1) 1 M  $\text{HCl}$  (2) 1M  $\text{HNO}_3$   
 (3) 1M  $\text{HClO}_4$  (4) 1M  $\text{H}_2\text{SO}_4$
171. Which of the following is an example of hydrolysis reaction?  
 (1)  $\text{NH}_4\text{Cl} \rightleftharpoons \text{NH}_4^+ + \text{Cl}^-$   
 (2)  $\text{NH}_4^+ + \text{H}_2\text{O} \rightleftharpoons \text{NH}_4\text{OH} + \text{H}^+$   
 (3)  $\text{Na}^+ + \text{H}_2\text{O} \rightleftharpoons \text{NaOH} + \text{H}^+$   
 (4)  $\text{CH}_3\text{COOH} + \text{HOC}_2\text{H}_5 \rightleftharpoons \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$
172. Which of the following salt will have lowest pH?  
 (1)  $\text{Na}_2\text{SO}_4$  (2)  $(\text{NH}_4)_2\text{SO}_4$   
 (3)  $\text{Na}_2\text{CO}_3$  (4)  $\text{NaCl}$
173. What will be pH of 0.1 M  $\text{NaCN}$  solution if  $K_a$  for  $\text{HCN}$  is  $10^{-6}$  at  $25^\circ\text{C}$ ?  
 (1) 6.5 (2) 9.5 (3) 3 (4) 7
174. The conjugate base of strong acid in the reaction  $\text{CH}_3\text{COOH} + \text{HCl} \rightleftharpoons \text{Cl}^- + \text{CH}_3\text{COOH}_2^+$  will be  
 (1)  $\text{HCl}$  (2)  $\text{Cl}^-$   
 (3)  $\text{CH}_3\text{COOH}$  (4)  $\text{CH}_3\text{COOH}_2^+$
175. What will be the degree of dissociation of 0.005 M  $\text{NH}_4\text{OH}$  solution. If  $\text{p}K_b$  for  $\text{NH}_4\text{OH}$  is 4.7  
 (1) 2% (2) 0.03% (3) 0.40% (4) 6.32%
176. Which of the following pairs can be used to form a buffer solution?  
 (1)  $\text{NaHSO}_4$  and  $\text{Na}_2\text{SO}_4$   
 (2)  $\text{NaOCl}$  and  $\text{NaCl}$   
 (3)  $\text{NH}_3$  and  $\text{NH}_4\text{Cl}$   
 (4)  $\text{NaH}_2\text{PO}_4$  and  $\text{NaCl}$
177. What is the molar solubility of  $\text{MgF}_2$  in a 0.2 M solution of  $\text{KF}$ ? ( $K_{sp} = 8 \times 10^{-8}$ )  
 (1)  $8 \times 10^{-8}\text{M}$  (2)  $8 \times 10^{-7}\text{M}$   
 (3)  $2 \times 10^{-6}\text{M}$  (4)  $2.7 \times 10^{-4}\text{M}$
178. If  $\text{PK}_a$  of acetic acid and  $\text{PK}_b$  of ammonium hydroxide are 4.76 each. The pH of ammonium acetate at  $25^\circ\text{C}$  is  
 (1) 7 (2) less than 7  
 (3) more than 7 (4) zero

179. The  $K_{sp}$  of  $\text{Mg}(\text{OH})_2$  is  $1 \times 10^{-12}$ , 0.01 M  $\text{Mg}^{+2}$  will begin to precipitate at the pH of  
 (1) 3 (2) 9 (3) 5 (4) 8
180. What is the hydronium ion concentration of 0.25 M  $\text{HA}$  solution? ( $K_a = 4 \times 10^{-8}$ )  
 (1)  $10^{-4}$  (2)  $10^{-5}$  (3)  $10^{-3}$  (4)  $10^{-10}$
181. The solubility of  $\text{PbF}_2$  (molecular wt = 245) is 0.46 gm/lit. What is solubility product?  
 (1)  $1.1 \times 10^{-10}$  (2)  $2.6 \times 10^{-9}$   
 (3)  $1.1 \times 10^{-7}$  (4)  $6.8 \times 10^{-9}$
182. What is molar solubility of  $\text{Ag}_2\text{CO}_3$  ( $K_{sp} = 4 \times 10^{-13}$ ) in 0.1 M  $\text{Na}_2\text{CO}_3$  solution  
 (1)  $10^{-6}$  (2)  $10^{-7}$  (3)  $2 \times 10^{-6}$  (4)  $2 \times 10^{-7}$

### THERMODYNAMICS

183. For vapourisation of water at 1 atm, values of  $\Delta H$  &  $\Delta S$  are  $40.6 \text{ KJ mol}^{-1}$  and  $108 \text{ JK}^{-1} \text{ mol}^{-1}$ , respectively will be. The temperature when  $\Delta G$  for this transition zero is :-  
 (1) 395.3K (2) 375.9K  
 (3) 373K (4) 380 K
184. Three moles of an ideal gas expanded spontaneously in to vacuum. Then which is correct ?  
 (1)  $w = 0, \Delta G = 0$  (2)  $w = 0, \Delta G < 0$   
 (3)  $w = 0, \Delta G > 0$  (4)  $w \neq 0, \Delta G = 0$
185. Match the following in List-I with List-II and select the correct option :-

	List-I		List-II
a	$K_p = Q$	i	Always nonspontaneous
b	$T > \Delta H/\Delta S$	ii	Isothermal process
c	$\Delta H = +ve, \Delta S = -ve$	iii	Equilibrium
d	$q = -w$	iv	spontaneous and endothermic

- (1)  $a \rightarrow (\text{iii})$   $b \rightarrow (\text{iv})$  ,  $c \rightarrow (\text{i})$ ,  $d \rightarrow (\text{ii})$   
 (2)  $a \rightarrow (\text{i})$   $b \rightarrow (\text{iii})$  ,  $c \rightarrow (\text{ii})$ ,  $d \rightarrow (\text{iv})$   
 (3)  $a \rightarrow (\text{iii})$   $b \rightarrow (\text{i})$  ,  $c \rightarrow (\text{iv})$ ,  $d \rightarrow (\text{ii})$   
 (4)  $a \rightarrow (\text{iii})$   $b \rightarrow (\text{ii})$  ,  $c \rightarrow (\text{i})$ ,  $d \rightarrow (\text{iv})$

186. From the following bond energies:

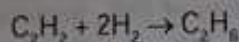
H-H bond energy = 420 KJ mol<sup>-1</sup>

C≡C bond energy = 601 KJ mol<sup>-1</sup>

C-C bond energy = 340 KJ mol<sup>-1</sup>

C-H bond energy = 425 KJ mol<sup>-1</sup>

Enthalpy for the reaction :



(1) -599 kJ mol<sup>-1</sup>

(2) -580 kJ mol<sup>-1</sup>

(3) -625 kJ mol<sup>-1</sup>

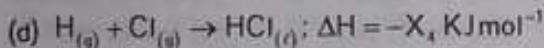
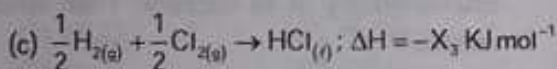
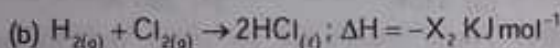
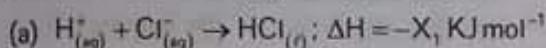
(4) -325 kJ mol<sup>-1</sup>

187. Which of the following is state function (a) q + w, (b) q (c) w (d) heating isobaric process (e) work in adiabatic process :-

(1) a, b, c (2) a, e

(3) a, d, e (4) a, d

188. Consider the following reaction :-



Enthalpy of formation of HCl<sub>(l)</sub> is :

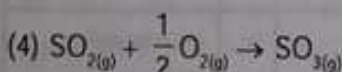
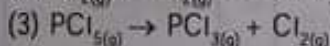
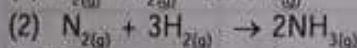
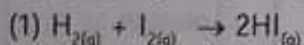
(1) -X<sub>1</sub> KJmol<sup>-1</sup>

(2) -X<sub>2</sub> KJmol<sup>-1</sup>

(3) -X<sub>3</sub> KJmol<sup>-1</sup>

(4) -X<sub>4</sub> KJmol<sup>-1</sup>

189. Assume each reaction is carried in open container. For which reaction  $\Delta H > \Delta E$  ?

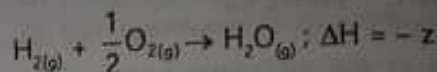
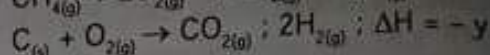
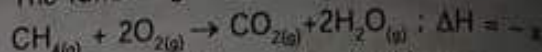


190. Given that Bond energy of H<sub>2</sub> and N<sub>2</sub> are 400 KJ mol<sup>-1</sup> and 240 KJmol<sup>-1</sup> respectively and  $\Delta H_f$  of NH<sub>3</sub> is -120 KJ mol<sup>-1</sup> calculate the bond energy of N-H bond :-

(1) 300 KJ mol<sup>-1</sup> (2) 250 KJ mol<sup>-1</sup>

(3) 410 KJ mol<sup>-1</sup> (4) 280 KJ mol<sup>-1</sup>

191. The following reaction are given :



Calculate the heat of formation of CH<sub>4</sub> ?

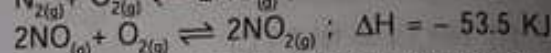
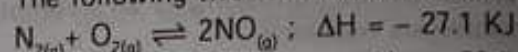
(1) x + y + z

(2) y + 2z - x

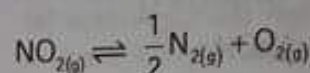
(3) x - y - 2z

(4) none of the above

192. The following two reactions are known :-



Calculate the enthalpy change for the reaction



(1) -40.3 KJ

(2) +80.6 KJ

(3) +40.3KJ

(4) -80.6 KJ

193.  $\Delta U^\circ$  of combustion of methane is -X KJ mol<sup>-1</sup>

The value of  $\Delta H^\circ$  is :-

(1) -X - 596R

(2) -X+596R

(3) X+596R

(4) X-596R

194. For the reaction



What are the sign of  $\Delta H$  and  $\Delta S$  ?

(1)  $\Delta H > 0, \Delta S > 0$

(2)  $\Delta H < 0, \Delta S < 0$

(3)  $\Delta H > 0, \Delta S < 0$

(4)  $\Delta H < 0, \Delta S > 0$

195. The equilibrium constant for a reaction is 100 what will be the value of  $\Delta G^\circ$  ? R = 8.314 JK<sup>-1</sup> mol<sup>-1</sup>, T=300 K :-

(1) -11488 KJ

(2) -11.488 KJ

(3) -12 KJ

(4) -12000 KJ

196. Standard enthalpy of vapourisation  $\Delta H^\circ$  for water is 40.66 KJ mol<sup>-1</sup>. The internal energy of vapourisation of water for its 2 mol will be :-

(1) +43.76

(2) +40.66

(3) +37.56

(4) None of these

197. During adiabatic expansion of ideal gas, which is correct ?

(1) Temperature increases

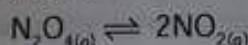
(2) q = 0

(3) Temperature remain constant

(4)  $\Delta E = 0$

198. A reversible process is one in which :-  
 (1) external pressure is constant throughout  
 (2) System is in equilibrium at initial & final stage  
 (3) Driving force is slightly greater than opposing force  
 (4) All of the above

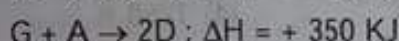
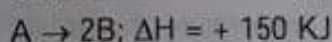
199. For the reaction :-



$\Delta U = 2.0 \text{ Kcal}$ ,  $\Delta S = 50 \text{ Cal K}^{-1}$  at  $300 \text{ K}$   
 calculate  $\Delta G$  ?

- (1) +12.4 KCal (2) -12.4 KCal  
 (3) -6.4 KCal (4) +6.4 KCal

200. Consider the following process :-



For  $\text{B} + \text{D} \rightarrow \text{G} + 2\text{C}$ ;  $\Delta H$  will be

- (1) +525 KJ (2) +325 KJ  
 (3) -175 KJ (4) -325 KJ
201. Enthalpy change for the reaction  
 $2\text{N}_{(g)} + 6\text{H}_{(g)} \rightarrow 2\text{NH}_{3(g)}$  is  $-900 \text{ KJ}$   
 The dissociation energy of N-H bond is  
 (1) +450 KJ (2) -450 KJ  
 (3) +150 KJ (4) -150 KJ

202. The heat of combustion of  $\text{CH}_4$  is  $-400 \text{ KJ mol}^{-1}$ .  
 Calculate the heat released when  $40\text{g}$  of  $\text{H}_2\text{O}$   
 is formed upon combustion :-

- (1) +444.4 KJ (2) +888.8 KJ  
 (3) -444.4 KJ (4) -888.8 KJ
203. For a spontaneous process :-  
 (1)  $\Delta G = 0$  (2)  $\Delta G < 0$   
 (3)  $\Delta G > 0$  (4) Any of the above

204. Which relation is incorrect :-

- (1)  $\Delta G = -T \Delta S_f$   
 (2)  $\Delta G^\circ = -2.303 RT \log K$   
 (3)  $\Delta H = \Delta U + \Delta n_g RT$   
 (4)  $w_{\text{useful}} = \Delta H$
205. Which is correct at equilibrium :-  
 (1)  $\Delta G^\circ = 0$  (2)  $\Delta G = 0$   
 (3)  $\Delta S = 0$  (4)  $\Delta E = 0$

206. 2 mol of an ideal gas at  $27^\circ\text{C}$  expands isothermally and reversibly from a volume of  $4\text{L}$  to  $40\text{L}$ . The work done (in KJ) by the gas is :-  
 (1)  $w = -28.72 \text{ KJ}$  (2)  $w = -11.488 \text{ KJ}$   
 (3)  $w = -5.736 \text{ KJ}$  (4)  $w = -4.988 \text{ KJ}$

207. 5 mol of ideal gas expand isothermally and irreversibly from a pressure of  $10 \text{ atm}$  to  $1 \text{ atm}$  against const. external pressure of  $1 \text{ atm}$ . work done at  $300 \text{ K}$  will be :-

- (1)  $-15.921 \text{ KJ}$  (2)  $-11.224 \text{ KJ}$   
 (3)  $-110.83 \text{ KJ}$  (4) none of these

208. Match the column :-

	Column-I		Column-II
A	Adiabatic process	P	$q=0$
B	Isothermal process	Q	$\Delta H=0$
C	Isoenthalpic process	R	$\Delta T=0$
D	Isoentropic process	S	$\Delta S=0$

- (1)  $\text{A} \rightarrow \text{P}$ ,  $\text{B} \rightarrow \text{S}$ ,  $\text{C} \rightarrow \text{Q}$ ,  $\text{D} \rightarrow \text{R}$   
 (2)  $\text{A} \rightarrow \text{Q}$ ,  $\text{B} \rightarrow \text{P}$ ,  $\text{C} \rightarrow \text{S}$ ,  $\text{D} \rightarrow \text{R}$   
 (3)  $\text{A} \rightarrow \text{P}$ ,  $\text{B} \rightarrow \text{R}$ ,  $\text{C} \rightarrow \text{Q}$ ,  $\text{D} \rightarrow \text{S}$   
 (4)  $\text{A} \rightarrow \text{P}$ ,  $\text{B} \rightarrow \text{R}$ ,  $\text{C} \rightarrow \text{S}$ ,  $\text{D} \rightarrow \text{Q}$

209. Match the column :-

A	$\text{C}_{(s, \text{graphite})} + \text{O}_{2(g)} \rightarrow \text{CO}_{2(g)}$	P	$\Delta H^\circ_{\text{Combustion}}$
B	$\text{CO}_{(g)} + 1/2 \text{O}_{2(g)} \rightarrow \text{CO}_{2(g)}$	Q	$\Delta H^\circ_{\text{sublimation}}$
C	$\text{CH}_{4(g)} \rightarrow \text{C}_{(g)} + 4\text{H}_{(g)}$	R	$\Delta H^\circ_{\text{formation}}$
D	$\text{C}_{(s)} \rightarrow \text{C}_{(g)}$	S	$\Delta H^\circ_{\text{atomisation}}$

- (1)  $\text{A} \rightarrow \text{R}$ ,  $\text{B} \rightarrow \text{S}$ ,  $\text{C} \rightarrow \text{P}$ ,  $\text{D} \rightarrow \text{Q}$   
 (2)  $\text{A} \rightarrow \text{R}$ ,  $\text{B} \rightarrow \text{P}$ ,  $\text{C} \rightarrow \text{Q}$ ,  $\text{D} \rightarrow \text{S}$   
 (3)  $\text{A} \rightarrow \text{P}$ ,  $\text{B} \rightarrow \text{S}$ ,  $\text{C} \rightarrow \text{Q}$ ,  $\text{D} \rightarrow \text{R}$   
 (4)  $\text{A} \rightarrow \text{R}$ ,  $\text{B} \rightarrow \text{P}$ ,  $\text{C} \rightarrow \text{S}$ ,  $\text{D} \rightarrow \text{Q}$

210. Match the column :-

Sign of $\Delta H$ & $\Delta S$ respectively	Nature of reaction
- & -	P Spontaneous only at low temperature
- & +	Q Spontaneous only at high temperature
+ & +	R Spontaneous at all temperature
+ & -	S non spontaneous at all temperature

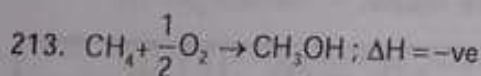
- (1)  $A \rightarrow P$ ,  $B \rightarrow R$ ,  $C \rightarrow Q$ ,  $D \rightarrow S$   
 (2)  $A \rightarrow R$ ,  $B \rightarrow P$ ,  $C \rightarrow Q$ ,  $D \rightarrow S$   
 (3)  $A \rightarrow Q$ ,  $B \rightarrow R$ ,  $C \rightarrow P$ ,  $D \rightarrow S$   
 (4)  $A \rightarrow P$ ,  $B \rightarrow Q$ ,  $C \rightarrow R$ ,  $D \rightarrow S$

211. Which of the following is correct for free expansion of ideal gas under isothermal condition :-

- (1)  $q = 0$ ,  $\Delta T < 0$ ,  $w < 0$   
 (2)  $q = 0$ ,  $\Delta T = 0$ ,  $w = 0$   
 (3)  $q \neq 0$ ,  $\Delta T = 0$ ,  $w = 0$   
 (4)  $q \neq 0$ ,  $\Delta T = 0$ ,  $w \neq 0$

212. The entropy of fusion of water is 5.260 cal/mole K calculate the enthalpy of fusion of water ?

- (1) 10.52 KCal / mol (2) 0.525 KCal / mol  
 (3) 2.225 KCal / mol (4) 1.435 KCal / mol



If enthalpy of combustion of  $CH_4$  and  $CH_3OH$  is  $-x$  &  $-y$  respectively which relation is correct ?

- (1)  $x > y$  (2)  $x < y$   
 (3)  $x = y$  (4)  $x \geq y$

214. The value of  $\Delta H$  and  $\Delta S$  for the reaction  $C_{\text{graphite}} + O_{2(g)} \rightarrow CO_{2(g)}$  are  $-100\text{KJ}$  and  $-100\text{JK}^{-1}$  respectively. The reaction will be spontaneous at :-

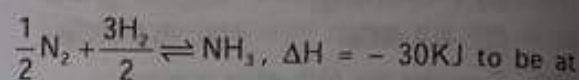
- (1) 1000 K (2) 900 K  
 (3) 1100 K (4) At temperatures

215. The heat of neutralization of  $LiOH$  and  $H_2SO_4$  at  $25^\circ\text{C}$  is  $69.6\text{ KJ mol}^{-1}$ . Calculate the heat of ionisation of  $LiOH$  will be nearly :-

- (1)  $22.5\text{ KJ mol}^{-1}$  (2)  $90\text{ KJ mol}^{-1}$   
 (3)  $45\text{ KJ mol}^{-1}$  (4)  $33.6\text{ KJ mol}^{-1}$

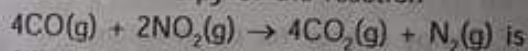
216. Criteria for spontaneity of process is :-

- (1) Maximum Randomness  
 (2) Maximum energy  
 (3) Minimum energy and max randomness  
 (4) Minimum randomness and max. energy

217. Standard entropy of  $N_2$ ,  $H_2$  and  $NH_3$  is are 60, 40 and  $50\text{JK}^{-1}\text{mol}^{-1}$  respectively. For the reaction,

to be at equilibrium, the temperature should be :-

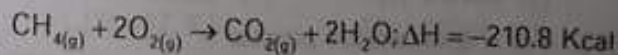
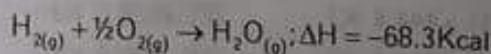
- (1) 500 K (2) 750 K  
 (3) 1000 K (4) 1250 K

218. The standard enthalpies of formation of  $CO$ ,  $NO_2$  and  $CO_2$  are  $-110.5\text{ kJ mol}^{-1}$ ,  $-33.2\text{ kJ mol}^{-1}$  and  $-393.5\text{ kJ mol}^{-1}$  respectively. The standard enthalpy of the reaction

- (1)  $-1065.6\text{ kJ}$  (2)  $-200\text{ kJ}$   
 (3)  $-700\text{ kJ}$  (4)  $850\text{ kJ}$

219. 18g of water is taken to prepare the tea. Find out the internal energy of vaporisation at  $100^\circ\text{C}$ . ( $\Delta_{\text{vap}}H$  for water at 373 K is  $40.66\text{ kJ mol}^{-1}$ )

- (1)  $37.56\text{ kJ mol}^{-1}$  (2)  $-37.56\text{ kJ mol}^{-1}$   
 (3)  $43.76\text{ kJ mol}^{-1}$  (4)  $-43.76\text{ kJ mol}^{-1}$

220. Given  $C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$ ;  $\Delta H = -94.2\text{Kcal}$ what will be heat of formation of  $CH_4$  in (Kcal)?

- (1)  $+45.9$  (2)  $-20.0$  (3)  $+47.8$  (4)  $-47.3$

221. Which of the following is correct for a spontaneous process?

- (1)  $\Delta H < 0$ ,  $\Delta S > 0$  at all possible temperature  
 (2)  $\Delta G > 0$   
 (3)  $\Delta S^\circ > 0$   
 (4)  $E_{\text{cell}} < 0$

222. Which among the following is an extensive property of the system?

- (1) temperature (2) volume  
 (3) refractive index (4) viscosity

223. From the given information, what is the standard enthalpy of formation for  $\text{Al}_2\text{O}_3(\text{s})$ ?  
 $2\text{Al}_2\text{O}_3(\text{s}) \rightarrow 4\text{Al}(\text{s}) + 3\text{O}_2(\text{g}); \Delta H^\circ_{\text{rxn}} = 3352 \text{ kJ}$   
 (1) -6704 kJ/mol (2) -3352 kJ/mol  
 (3) -1676 kJ/mol (4) 1676 kJ/mol
224. Which of the following thermodynamic properties must be associated with a reaction spontaneous at only high temperatures  
 (1)  $\Delta H < 0, \Delta S < 0$  (2)  $\Delta H < 0, \Delta S > 0$   
 (3)  $\Delta H > 0, \Delta S > 0$  (4)  $\Delta H > 0, \Delta S < 0$
225. Given enthalpy of formation of  $\text{CO}_2(\text{g})$  and  $\text{CaO}(\text{s})$  are -94.0 kJ and -16.0 kJ respectively and the enthalpy of the reaction  $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$  is 92 kJ. The enthalpy of formation of  $\text{CaCO}_3(\text{s})$  is  
 (1) -42 kJ (2) -202 kJ  
 (3) 202 kJ (4) -288 kJ
226. If the  $\Delta G^\circ$  of a cell reaction  $\text{AgCl} + \text{e}^- \rightarrow \text{Ag} + \text{Cl}^-$  is -21.20 kJ the standard emf of cell is  
 (1) 0.329V (2) 0.220V  
 (3) -0.220V (4) -0.110V
227. Consider the following reactions  
 $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + X \text{ kJ}$   
 $\text{CO}(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + Y \text{ kJ}$   
 The heat of formation of  $\text{CO}(\text{g})$  is  
 (1) - (X+Y) kJ/mol (2) (X-Y) kJ/mol  
 (3) (Y-X) kJ/mol (4) (Y+X) kJ/mol
228. The enthalpy change for the following reaction is 368 kJ. Calculate the average O-F bond energy  $\text{OF}_2(\text{g}) \rightarrow \text{O}(\text{g}) + 2\text{F}(\text{g})$   
 (1) 184 kJ/mol (2) 368 kJ/mol  
 (3) 536 kJ/mol (4) 736 kJ/mol

### REDOX

229. In the reaction  $\text{SO}_2 + \text{H}_2\text{S} \rightarrow 3\text{S} + 2\text{H}_2\text{O}$  the substance oxidised is :-  
 (1) S (2)  $\text{SO}_2$  (3)  $\text{H}_2\text{S}$  (4)  $\text{H}_2\text{O}$
230. The oxidation number of phosphorous in  $\text{Ba}(\text{H}_2\text{PO}_2)_2$  is :-  
 (1) +3 (2) +2 (3) +1 (4) -1
231. Which of the following reaction do not involve oxidation-reduction?  
 (i)  $2\text{Cs} + 2\text{H}_2\text{O} \rightarrow 2\text{CsOH} + \text{H}_2$   
 (ii)  $2\text{CaI}_2 \rightarrow 2\text{CaI} + \text{I}_2$   
 (iii)  $\text{NH}_4\text{Br} + \text{KOH} \rightarrow \text{KBr} + \text{NH}_3 + \text{H}_2\text{O}$   
 (iv)  $4\text{KCN} + \text{Fe}(\text{CN})_6 \rightarrow \text{K}_4[\text{Fe}(\text{CN})_6]$   
 (1) I, II (2) I, III  
 (3) I, III, IV (4) III, IV
232. In the reaction  $3\text{Br}_2 + 6\text{CO}_3^{2-} + 3\text{H}_2\text{O} \rightarrow 5\text{Br}^- + \text{BrO}_3^- + 6\text{HCO}_3^-$   
 (1) Bromine is oxidised and carbonate is reduced  
 (2) Bromine is reduced and water is oxidised  
 (3) Bromine is neither reduced nor oxidised  
 (4) Bromine is both reduced and oxidised
233. Which of the following is not a disproportionation reaction :-  
 (A)  $\text{NH}_4\text{NO}_3 \rightarrow \text{N}_2\text{O} + \text{H}_2\text{O}$   
 (B)  $\text{P}_4 \rightarrow \text{PH}_3 + \text{HPO}_2$   
 (C)  $\text{PCl}_5 \rightarrow \text{PCl}_3 + \text{Cl}_2$   
 (D)  $\text{IO}_3^- + \text{I}^- \rightarrow \text{I}_2$   
 (1) I, II (2) I, III, IV  
 (3) II, IV (4) I, III
234. The number of moles of  $\text{K}_2\text{Cr}_2\text{O}_7$  reduced by 1 mol of  $\text{Sn}^{2+}$  ions will be :-  
 (1) 1/3 (2) 3  
 (3) 1/6 (4) 6
235. The number of moles of  $\text{KMnO}_4$  required to oxidise 2 mol of  $\text{FeC}_2\text{O}_4$  in acidic medium is :-  
 (1) 1.2 (2) 3.33 (3) 0.4 (4) 0.8
236. The oxidation number of 'P' in  $\text{Mg}_2\text{P}_2\text{O}_7$  is :-  
 (1) +3 (2) +2 (3) +5 (4) -3
237. Which of the following acid possesses oxidising, reducing and complex forming properties :-  
 (1)  $\text{HNO}_3$  (2)  $\text{H}_2\text{SO}_4$   
 (3)  $\text{HCl}$  (4)  $\text{HNO}_2$
238. The number of electrons lost in the following change is :-  
 $\text{Fe} + \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}^+$   
 (1) 2 (2) 4 (3) 6 (4) 8
239. Which gas is evolved when  $\text{PbO}_2$  is treated with concentrated  $\text{HNO}_3$  :-  
 (1)  $\text{NO}_2$  (2)  $\text{O}_2$  (3)  $\text{N}_2$  (4)  $\text{N}_2\text{O}$
240. For decolourisation of 1.5 moles of  $\text{KMnO}_4$  the moles of  $\text{H}_2\text{O}_2$  requires  
 (1)  $\frac{3}{2}$  (2)  $\frac{9}{4}$  (3)  $\frac{15}{4}$  (4)  $\frac{21}{4}$
241. In which transfer of five electrons takes place?  
 (1)  $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$   
 (2)  $\text{MnO}_4^- \rightarrow \text{MnO}_2$   
 (3)  $\text{Cr}_2\text{O}_7^{2-} \rightarrow 2\text{Cr}^{3+}$   
 (4)  $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$

## Pre-Medical

242. In which reaction  $\text{H}_2\text{O}_2$  acts as reducing agent ?  
 (1)  $\text{Ag}_2\text{O} + \text{H}_2\text{O}_2 \rightarrow 2\text{Ag} + \text{H}_2\text{O} + \text{O}_2$   
 (2)  $2\text{KI} + \text{H}_2\text{O}_2 \rightarrow 2\text{KOH} + \text{I}_2$   
 (3)  $\text{PbS} + 4\text{H}_2\text{O}_2 \rightarrow \text{PbSO}_4 + 4\text{H}_2\text{O}$   
 (4)  $\text{H}_2\text{O}_2 + \text{SO}_2 \rightarrow \text{H}_2\text{SO}_4$
243. In the equation  $\text{NO}_2^- + \text{H}_2\text{O} \rightarrow \text{NO}_3^- + 2\text{H}^+ + ne^-$ , value of  $n$  is :-  
 (1) 1 (2) 2  
 (3) 3 (4) None of these
244. What mass of  $\text{HNO}_3$  is needed to convert 5g of iodine into iodic acid according to the reaction,  $\text{I}_2 + \text{HNO}_3 \rightarrow \text{HIO}_3 + \text{NO}_2 + \text{H}_2\text{O}$  :-  
 (1) 12.4g (2) 24.8g  
 (3) 0.248 g (4) 49.6g
245. Oxidation number of 'Cl' in  $\text{NOClO}_4$  is :-  
 (1) +7 (2) -7 (3) +5 (4) -5
246. How many gram of  $\text{KMnO}_4$  is contained in 4litre of 0.05 N solution. The  $\text{KMnO}_4$  is to be used as an oxidant in acid medium ( $M_w = 158$ ):-  
 (1) 1.58 g (2) 15.8 g  
 (3) 6.32 g (4) 31.6 g
247. The equivalent mass of  $\text{MnSO}_4$  is half of its molecular mass when it is converted to :-  
 (1)  $\text{Mn}_2\text{O}_3$  (2)  $\text{MnO}_2$   
 (3)  $\text{MnO}_4^-$  (4)  $\text{MnO}_4^{2-}$
248. In the reduction of dichromate by  $\text{Fe(II)}$ , the number of electrons involved per chromium atom is :-  
 (1) 2 (2) 1 (3) 3 (4) 4
249. In acidic medium, 0.1M  $\text{KMnO}_4$  may oxidise :-  
 (1) 0.15 M  $\text{C}_2\text{O}_4^{2-}$  (2) 0.5 M  $\text{Fe}^{2+}$   
 (3) 0.166 M  $\text{FeC}_2\text{O}_4$  (4) 0.6M  $\text{Cr}_2\text{O}_7^{2-}$
250. How many grams of  $\text{I}_2$  are present in a solution which requires 40ml of 0.11 N  $\text{Na}_2\text{S}_2\text{O}_3$  to react with it :-  
 $\text{I}_2 + \text{S}_2\text{O}_3^{2-} \rightarrow \text{S}_4\text{O}_6^{2-} + 2\text{I}^-$   
 (1) 12.7g (2) 0.558g (3) 25.4 g (4) 11.4g
251. In balancing the half reaction,  $\text{S}_2\text{O}_3^{2-} \rightarrow \text{S}$ , the number of electrons that must be added is :-  
 (1) 2 on the right (2) 2 on the left  
 (3) 4 on the left (4) 4 on the right
252. What volume of 3 molar  $\text{HNO}_3$  is needed to oxidise 8g of  $\text{Fe}^{2+}$  to  $\text{Fe}^{3+}$  while  $\text{HNO}_3$  gets converted to  $\text{NO}$  :-  
 (1) 8 ml (2) 16 ml (3) 32 ml (4) 64 ml
253. In alkaline medium  $\text{KMnO}_4$  reacts as follows -  
 $2\text{KMnO}_4 + 2\text{KOH} \rightarrow 2\text{K}_2\text{MnO}_4 + \text{H}_2\text{O} + \text{O}_2$   
 Therefore its equivalent mass will be  
 (1) 31.6 (2) 52.7 (3) 79 (4) 158
254. The oxidation number of C in  $\text{K}_2\text{C}_2\text{O}_8$  is  
 (1) +3 (2) +4 (3) 0 (4) +1
255. The oxidation number of sulphur, chromium and nitrogen in  $\text{H}_2\text{SO}_5$ ,  $\text{Cr}_2\text{O}_7^{2-}$  and  $\text{NO}_3^-$  are respectively  
 (1) +8, +6, +6 (2) +6, -6, +8  
 (3) +6, +6, +5 (4) +8, +6, +7
256.  $\text{As}_2\text{S}_3 + \text{HNO}_3 \rightarrow \text{H}_3\text{AsO}_4 + \text{H}_2\text{SO}_4 + \text{NO}$   
 the element which is oxidised in the reaction is/are  
 (1) As (2) S (3) N (4) As and S

## BEHAVIOUR OF GASES

257. A balloon is filled with hydrogen at room temp. It will burst if, pressure exceeds 0.2 bar. If at 1 bar pressure the gas occupies 2.27L volume. Up to what volume can the balloon be expanded. :-  
 (1) < 11.35 L (2) =11.35 L  
 (3) >11.35 L (4) upto any volume
258. On a ship sailing in pacific ocean where temp. is  $23.4^\circ\text{C}$  A balloon is filled with 2L air, what will be the volume of balloon when the ship reaches Indian ocean where temp is  $26.1^\circ\text{C}$  :-  
 (1) 12.01L (2) 6.01L  
 (3) 2.01L (4) 1.02L
259. At  $27^\circ\text{C}$  and 500 mm Hg pressure a gas occupies 400 mL volume. What will be its pressure at a height where temp is  $7^\circ\text{C}$  and volume is 550 mL :-  
 (1) 340 mm (2) 240 mm  
 (3) 440 mm (4) 540 mm
260. A methane +  $\text{H}_2$  mixture contains 10g methane and 5g Hydrogen. If the pressure of the mixture is 30 atm. what is the partial pressure of  $\text{H}_2$  in mixture :-  
 (1) 6 atm (2) 129 atm  
 (3) 24 atm (4) 189 atm
261. The temp. at which a real gas obeys ideal gas law over an appreciable range of pressure is called :-  
 (1) Boiling temp  
 (2) Freezing temp  
 (3) Boyle's temp  
 (4) Inversion temp

262. The pressure exerted by real gas is :-  
 (1) lower than ideal gas  
 (2) more than ideal gas  
 (3) equal to ideal gas  
 (4) can't be calculated
263. At critical temp. the value of  $z$  is :-  
 (1)  $\frac{8}{3}$  (2)  $\frac{3}{8}$  (3)  $\frac{1}{8}$  (4)  $\frac{1}{27}$
264. Which one of the following is/ true :-  
 (i) At critical temp the surface separating two phases disappears  
 (ii) below critical temperature a gas is called vapour  
 (iii) A gas can't be liquified below critical temp.  
 (iv) Higher the critical temp. difficult to liquify a gas  
 (1) (i), (iii), (iv) (2) (i), (ii), (iv)  
 (3) (iii), (iv) (4) (i), (ii)
265. Which one of the following is correctly matched :-  
 (i)  $z = 1$  (A) -ve deviation  
 (ii)  $z < 1$  (B) +ve deviation  
 (iii)  $z > 1$  (C) Ideal behaviour  
 (iv)  $z_0 = 3/8$  (D) At critical conditions  
 (1) (i) -A (ii) -B (iii) -C, (iv) -D  
 (2) (i) -B (ii) -A (iii) -D, (iv) -C  
 (3) (i) -C (ii) -A (iii) -B, (iv) -D  
 (4) (i) -D (ii) -B (iii) -A, (iv) -C
266. A real gas show ideal behaviour at :-  
 (1) High pressure, high temperature  
 (2) High pressure, low temperature  
 (3) low pressure, low temperature  
 (4) low pressure, high temperature
267. A 1 mol gas occupies 2.4L volume at  $27^\circ\text{C}$  and 10 atm pressure then it show :-  
 (1) +ve deviation (2) -ve deviation  
 (3) Ideal behaviour (4) None of these
268. The value of vander waal's constant  $a$  and  $b$  for two gases X and Y are 4.6, 0.04 (for X) and 5.1, 0.06 (for Y). Which can be liquified easily an application of pressure :-  
 (1) X (2) Y  
 (3) Both 1 & 2 (4) None of these

269. A gas X is diffused  $\frac{1}{\sqrt{2}}$  time slower than  $\text{SO}_2$  at same temperature calculate V.D of gas X :-  
 (1) 64 (2) 128 (3) 32 (4) 16
270. The ratio of rate of diffusion for two gases is 1 : 2 if their molecular masses :-  
 (1) 16 : 1 (2) 1 : 16 (3) 1 : 4 (4) 4 : 1
271. Which of the following gases always show positive deviation from ideal gas behaviour with increase in pressure?  
 (1)  $\text{NH}_3$  (2)  $\text{CO}_2$  (3)  $\text{H}_2$  (4)  $\text{CO}$
272. If the ratio of the rates of diffusion of two gases A and B is 4:1 the ratio of their density is  
 (1) 1:16 (2) 1:4 (3) 1:2 (4) 1:8
273. Which of the following gas will have highest value of van der Waal's constant ' $a$ '?  
 (1)  $\text{H}_2$  (2) He (3)  $\text{CO}_2$  (4)  $\text{NH}_3$
274. At high temperature and low pressure van der Waal's equation becomes  
 (1)  $\left(P + \frac{a}{V^2}\right) = RT$  (2)  $PV = RT$   
 (3)  $P(V-b) = RT$  (4)  $\left(P + \frac{a}{V^2}\right)(V-b) = RT$
275. In the van der Waal's equation, the term  $\left(\frac{a}{V^2}\right)$  is introduced to correct for  
 (1) the volume occupied by the molecules themselves  
 (2) the effect of kinetic energies of molecules  
 (3) the momentum changes when molecules collide  
 (4) the effect of forces of attraction between molecules
276. At relatively high pressure, vander Waal's equation reduces to  
 (1)  $PV = RT$  (2)  $PV = RT + \frac{a}{V}$   
 (3)  $PV = RT + Pb$  (4)  $PV = RT - \frac{a}{V^2}$

### SOLID STATE

277. The unit cell with parameters  $\alpha = \beta = \gamma = 90^\circ$  and  $a = b \neq c$  is :-  
 (1) cubic (2) triclinic  
 (3) Hexagonal (4) Tetragonal

278. Which of the following crystal lattice has minimum empty space ?  
 (1) Simple cubic  
 (2) Body centered cubic  
 (3) Face centered cubic  
 (4) All are correct
279. Molybdenum (At. wt = 96 g mol<sup>-1</sup>) crystallises as BCC crystal. If density of crystal is 10.3 g/cm<sup>3</sup>, then radius of Mo atom is :-  
 (1) 111 pm (2) 314 pm  
 (3) 135.96 pm (4) None of these
280. In the closest packing of atoms A (radius :  $r_A$ ), the radius of atom of B that can be fitted into tetrahedral void is :-  
 (1)  $0.155 r_A$  (2)  $0.225 r_A$   
 (3)  $0.414 r_A$  (4)  $0.732 r_A$
281. In a face centered cubic arrangement of A and B atoms, where A atoms are at the corners of the unit cell and B atoms are at face centers. One of the B atoms missing from one of the face in unit cell. The simplest formula of compound is :-  
 (1)  $AB_5$  (2)  $A_8B_5$   
 (3)  $A_2B_5$  (4)  $AB_{2.5}$
282. The coordination number of cation and anion in anti-fluorite ( $Na_2O$ ) is :-  
 (1) 4 : 8 (2) 8 : 4  
 (3) 6 : 6 (4) 4 : 4
283. Select the correct statement for CsCl crystal :-  
 (1)  $Cs^+$  forms simple cubic lattice,  $Cl^-$  forms simple cubic lattice  
 (2)  $Cl^-$  occupies the body center of  $Cs^+$   
 (3)  $Cs^+$  occupies the body center of  $Cl^-$   
 (4) All are correct
284. The radius of divalent cation  $A^{+2}$  is 94 pm and divalent anion  $B^{-2}$  is 146 pm. The structure of compound AB is :-  
 (1) Rock salt  
 (2) Zinc blende  
 (3) Anti fluorite  
 (4) CsCl type
285. In a solid, oxide ions are arranged in ccp, cations A occupy  $\left(\frac{1}{8}\right)^{th}$  of tetrahedral voids and cations B occupy  $\left(\frac{1}{4}\right)^{th}$  of octahedral voids. The formula of compound is :-  
 (1)  $ABO_4$  (2)  $AB_2O_3$   
 (3)  $A_2BO_4$  (4)  $AB_4O_4$
286. The coordination number and number of carbon atoms in a unit cell of diamond is :-  
 (1) 4 and 4 (2) 4 and 8  
 (3) 8 and 4 (4) 6 and 6
287. CsBr has BCC type structure with edge length of 4.3 pm, the shortest interionic distance between  $Cs^+$  and  $Br^-$  is :-  
 (1) 1.86 pm (2) 7.44 pm  
 (3) 4.3 pm (4) 3.72 pm
288. An element has a body centered cubic (BCC) structure with edge length of 288 pm. The density of the element is 7.2 g/cm<sup>3</sup>. How many atoms are present in 208g of the element :-  
 (1)  $6 \times 10^{23}$  (2)  $2.4 \times 10^{23}$   
 (3)  $24 \times 10^{23}$  (4)  $12 \times 10^{23}$
289. A compound is formed by two elements M and N. The element N forms ccp and atoms of M occupy  $\left(\frac{1}{3}\right)^{th}$  of tetrahedral voids, what is the formula of compound :-  
 (1)  $M_3N_2$   
 (2)  $M_2N_3$   
 (3)  $M_3N$   
 (4)  $MN_3$
290. x-ray diffraction studies of an element shows it Crystallises in FCC unit cell with edge length  $3.6 \times 10^{-8}$  cm, in a separate experiment it is determined that density of element is 8.92 g/cm<sup>3</sup>. Calculate the atomic mass of element ?  
 (1) 156 (2) 63  
 (3) 40 (4) 23

291. If 'r' stands for radius of atom of the cubic systems like simple cubic, body centered cubic, and face centered cubic, then ratio of edge length of cube in these systems will be respectively :-  
 (1)  $\frac{1}{2}r : \sqrt{3}r : \frac{1}{\sqrt{2}}r$  (2)  $\frac{1}{2}r : \frac{\sqrt{3}}{2}r : \frac{\sqrt{2}}{2}r$   
 (3)  $2r : \frac{4r}{\sqrt{3}} : \frac{4r}{\sqrt{2}}$  (4)  $2r : \frac{4r}{\sqrt{2}} : \frac{4r}{\sqrt{3}}$
292. The fraction of total volume occupied by the atoms present in FCC is :-  
 (1)  $\frac{\pi}{6}$  (2)  $\frac{\pi}{3\sqrt{2}}$  (3)  $\frac{\pi}{4\sqrt{2}}$  (4)  $\frac{\pi}{4}$
293. CaS exists in cubic closed packed structure of  $S^{2-}$  ions in which  $Ca^{+2}$  occupy tetrahedral voids what is the percentage of tetrahedral voids occupied by  $Ca^{+2}$  :-  
 (1) 25% (2) 50% (3) 75% (4) 100%
294. The atomic radius of strontium (Sr) is 215 pm and it crystallises in cubic closed packed structure. The edge length of cube is :-  
 (1) 430 pm (2) 608.2 pm  
 (3) 496.5 pm (4) None of these
295. Analysis shows that nickel oxide has formula  $Ni_{0.98}O$  what fraction of nickel exists as  $Ni^{+2}$  :-  
 (1) 0.94 (2) 0.959 (3) 0.98 (4) 0.02
296. Which of the following is not a ionic solid ?  
 (1) NaCl (2) MgO (3) CsCl (4) SiC
297. For tetragonal crystal, which statement is incorrect ?  
 (1) All the axial length are not equal  
 (2) Two axial angle are equal  
 (3) Two axial length are equal  
 (4) None of these
298. A solid compound PQ has CsCl structure. If the radius of cation is 120 pm then find radius of anion ?  
 (1) 88 pm (2) 140 pm  
 (3) 164 pm (4) 120 pm
299. The vacant space in simple cubic lattice unit cell is :-  
 (1) 32% (2) 52% (3) 48% (4) 25%
300. What will be value of  $r_{Na^+} + r_{Cl^-}$  in NaCl crystal having edge length 'a' ?  
 (1)  $\frac{a\sqrt{3}}{2}$  (2)  $\sqrt{2}a$  (3)  $\frac{a}{2}$  (4)  $\frac{a}{2\sqrt{2}}$
301. Which of the following passes both Schottky and Frankel defect :-  
 (1) NaCl (2) AgCl (3) AgBr (4) KCl
302. The incorrect statement regarding defects in crystalline solid is :-  
 (1) Density is crystal decreases in Schottky defect  
 (2) Frenkel defect is dislocation defect  
 (3) Defects increases conductivity of solid  
 (4) Density of crystal increases in frenkel defect
303. Select the incorrect statement ?  
 (1) Stoichiometry of crystal remain uneffected due to schottky defect  
 (2) Frenkel defect is usually shown by ionic compounds having low coordination number  
 (3) F-center generation is responsible for imparting color to the crystal  
 (4) Density of crystal always increases due to substitutional impurity defect
304. When AgCl is dopped with 0.01 mole  $CdCl_2$ . What is number of cationic vacancies ?  
 (1)  $0.02 N_A$  (2)  $0.01 N_A$   
 (3) 0.01 (4) 0.02
305. Number of tetrahedral void(s) per atom present in cubic closed packed structure is :-  
 (1) 2 (2) 4 (3) 8 (4) 1
306. If anions (A) form hexagonal closest packing cations (C) occupy  $(2/3)^{th}$  octahedral voids in it, then general formula of compound is :-  
 (1) CA (2)  $CA_2$  (3)  $C_2A_3$  (4)  $C_3A_2$
307. Total volume of atoms present in a fcc unit cell of metal is (r is atomic radius)  
 (1)  $\frac{20}{3}\pi r^3$  (2)  $\frac{24}{3}\pi r^3$   
 (3)  $\frac{12}{3}\pi r^3$  (4)  $\frac{16}{3}\pi r^3$
308. The distance between  $Na^+$  and  $Cl^-$  ion ion in NaCl is 281 pm. What is the edge length of the cube  
 (1) 1405 pm (2) 562 pm  
 (3) 843 pm (4) 281 pm

309. In a solid, oxide ions are arranged in ccp form cations A occupy one sixth of THV and cations B occupy one third of the OHV. The empirical formula of compound is  
 (1)  $A_2BO_3$  (2)  $A_3B_2O_3$  (3)  $ABO_3$  (4)  $AB_2O_3$
310. In a compound, atoms A occupy  $\frac{3}{4}$  of the tetrahedral voids and atoms B form ccp lattice. The empirical formula of the compound is  
 (1)  $A_3B_4$  (2)  $A_2B_3$  (3)  $AB$  (4)  $A_2B_2$
311. Copper crystallises in fcc with a unit cell length of 361 pm. What is the radius of copper atom?  
 (1) 108 pm (2) 127 pm  
 (3) 157 pm (4) 181 pm
312. The coordination number of  $F^-$  ion in  $CaF_2$  crystalline structure is  
 (1) 8 (2) 2 (3) 4 (4) 6
313. The number of atoms in 100 g of a fcc crystal with density  $d = 10 \text{ g/cm}^3$  and cell edge is 100 pm  
 (1)  $1 \times 10^{25}$  (2)  $2 \times 10^{25}$   
 (3)  $3 \times 10^{25}$  (4)  $4 \times 10^{25}$
314. A face centred cubic is made up of two types of atoms A and B in which A occupies the corner positions and B occupies the face centres. If atoms along one of the body diagonal are removed, empirical formula of remaining solid will be  
 (1)  $AB_2$  (2)  $A_3B$  (3)  $A_7B_3$  (4)  $AB_4$
315. A solid is formed and it has three types of atoms X, Y and Z, X forms a fcc lattice with Y atoms occupying all tetrahedral voids and Z atoms occupying half of octahedral voids. The formula of solid is  
 (1)  $X_4YZ_2$  (2)  $X_4Y_2Z$  (3)  $XY_2Z_4$  (4)  $X_2Y_4Z$
316. An element X (at. wt. = 80 gm/mol) having fcc structure, calculate number of unit cell in 8 gm of X  
 (1)  $0.4 N_A$  (2)  $0.025 N_A$   
 (3)  $4 N_A$  (4)  $0.2 N_A$
317. In the rock salt AB, if C is introduced in tetrahedral voids such that no distortion occurs. Then formula of resultant compound is  
 (1) ABC (2)  $ABC_2$  (3)  $A_4B_4C$  (4)  $ABC_8$
- SOLUTION**
318. In an aqueous solution ethylene glycol has the mass percentage (% w/w) 30% then the mole fraction of ethylene glycol will be :-  
 (1) 0.428 (2) 0.124  
 (3) 0.11 (4) 0.889
319. What will be the mass percentage of resulting solution prepared by mixing 15% (w/w) 500 g aqueous solution of urea with 25% (w/w) 400g aqueous solution of it :-  
 (1) 18% (2) 20%  
 (3) 25% (4) 15%
320. What will be the molality of solution prepared by dissolving 3.7 g propanoic acid in 80 g benzene ?  
 (1) 0.77 m (2) 0.625 m  
 (3) 0.045 m (4) 46.25 m
321. If the sea water is 3.5% (w/w) aqueous solution of NaCl then its molality will be :-  
 (1) 0.598 (2) 36.27 m  
 (3) 0.62 m (4) 0.578 m
322. 10% (w/v) solution of glucose is isotonic with 4% (w/v) solution of non-volatile solution then molar mass of non-volatile solute will be :-  
 (1) 36 (2) 72  
 (3) 54 (4) 63
323. The vapour pressure of mixture of toluene and xylene at  $90^\circ\text{C}$  is 0.5 atm. If at this temperature vapour pressure of pure toluene and xylene are 400 mm and 150 mm respectively then what will be the mole fraction of toluene in mixture ?  
 (1) 0.08 (2) 0.92  
 (3) 0.88 (4) 0.46
324. What will be the freezing point of 0.2 molal aqueous solution of  $MgBr_2$ ? If salt dissociates 40% in solution and  $K_f$  for water is  $1.86 \text{ K Kg mol}^{-1}$   $MgBr_2$  :-  
 (1)  $-3.35^\circ\text{C}$  (2)  $-0.67^\circ\text{C}$   
 (3)  $-0.6^\circ\text{C}$  (4)  $-0.45^\circ\text{C}$
325. Density of 12.25% (w/w)  $H_2SO_4$  solution is 1.052 g/ml then molarity of solution is :-  
 (1) 1.315 M (2) 2.63 M  
 (3) 0.657 M (4) 1 M
326. Incorrect relationship for mole fraction is :-  
 (1)  $x < 1$  (2)  $0 < x < 1$   
 (3)  $-2 < x < +2$  (4) Always positive
327. 0.1 molal solution of  $Hg(NO_3)_2$  freezes at  $-0.558^\circ\text{C}$ . The cryoscopic constant for water is  $1.86 \text{ K Kg mol}^{-1}$  then what will be the percentage ionisation of salt ?  
 (1) 33.33% (2) 50%  
 (3) 75% (4) 100%

328. Which of the following solution has maximum vapour pressure :-  
 (1) 1 N  $\text{KNO}_3$  (2) 1 N  $\text{Ba}(\text{NO}_3)_2$   
 (3) 1 N  $\text{Al}_2(\text{SO}_4)_3$  (4) 1 N  $\text{Ti}(\text{NO}_3)_4$
329. When  $\text{HgI}_2$  is added in KI solution. The freezing point of solution :-  
 (1) increases  
 (2) decreases  
 (3) Remains unchanged  
 (4) Can't predict
330. A solute dissociate in solution according to reaction  $2\text{A} \rightarrow 5\text{B}$ . If solute shows 30% dissociation then van't Hoff factor will be :-  
 (1) 2.2 (2) 1.45 (3) 2.9 (4) 1.9
331. An aqueous solution of urea [6% w/v] is isotonic with NaCl solution then mass-volume percentage (%w/v) of NaCl solution will be :-  
 (1) 1.46% (2) 5.85% (3) 2.92% (4) 11.7%
332. The vapour pressure of pure liquid A and liquid B at 350 K are 440 mm and 720 mm of Hg. If total vapour pressure of solution is 580 mm of Hg then the mole fraction of liquid A in vapour phase will be :-  
 (1) 0.31 (2) 0.38  
 (3) 0.62 (4) 0.76
333. The composition of Azeotropic mixture of  $\text{HCl} + \text{H}_2\text{O}$  is :-  
 (1) 85%  $\text{H}_2\text{O}$  + 15 %  $\text{HCl}$   
 (2) 50%  $\text{H}_2\text{O}$  + 50 %  $\text{HCl}$   
 (3) 70%  $\text{H}_2\text{O}$  + 29.2 %  $\text{HCl}$   
 (4) 79.8%  $\text{H}_2\text{O}$  + 20.2 %  $\text{HCl}$
334. In any binary azeotropic mixture :-  
 (1) volatility of A > volatility of B  
 (2) volatility of A < volatility of B  
 (3) volatility of A = volatility of B  
 (4) volatility of A = 2 × volatility of B
335. If  $T_1$ ,  $T_2$  and  $T_3$  are boiling points of component A, Component B and azeotropic mixture then which of the following relation is correct for a minimum boiling azeotrope :-  
 (1)  $T_1 < T_3$  (2)  $T_2 < T_3$   
 (3)  $T_3 < T_1$  (4)  $T_3 = T_2$
336. Which of the following relationship is correct ?  
 (1)  $K_b = \frac{RT_b^2}{1000 \times \Delta H_v}$  (2)  $K_b = \frac{RT_b^2}{1000 L_v}$   
 (3)  $K_f = \frac{RT_f^2}{1000 \Delta H_f}$  (4)  $K_f = \frac{RT_f^2 \times M}{1000 \times L_f}$
337. Which one is a colligative property :-  
 (1) Depression in freezing point of solute  
 (2) Elevation in boiling point of solution  
 (3) Osmotic pressure of solvent  
 (4) Relative lowering in vapour pressure of solvent
338. Which of the following 0.2m aqueous solutions will show minimum freezing point :-  
 (1)  $\text{CaCl}_2$  (2)  $\text{K}_2\text{SO}_4$   
 (3)  $\text{Al}(\text{NO}_3)_3$  (4)  $\text{KBr}$
339. For which of the following solutions observed boiling point is greater than theoretical boiling point ?  
 (1)  $\text{CHCl}_3 + \text{CCl}_4$  (2)  $\text{CCl}_4 + \text{SiCl}_4$   
 (3)  $\text{C}_2\text{H}_5\text{OH} + \text{C}_6\text{H}_6$  (4)  $\text{CHCl}_3 + \text{C}_6\text{H}_6$
340. The boiling point of solution obtained by dissolving 0.51 g anthracene in 35 g chloroform increases by  $0.32^\circ\text{C}$  then what will be the molar mass of anthracene if for chloroform  $K_b = 3.9 \text{ K Kg mol}^{-1}$  :-  
 (1) 175.2 (2) 177.6  
 (3) 178.6 (4) 182.3
341. Which of the following relationship is correct ?  
 (1)  $\frac{P^\circ - P_s}{P^\circ} = \chi_A$  (2)  $Y_B = \frac{P_B^\circ - \chi_B}{P_A^\circ}$   
 $P_A = P_A^\circ \chi_A$   
 (3)  $P_A^* = P_A^\circ \chi_A$  (4)  $P_s = P_A^\circ \chi_A + P_B^\circ \chi_B$
342. What will be the osmotic pressure of 5% (w/v) aqueous solution of urea at  $17^\circ\text{C}$  ?  
 (1) 19.84 atm (2) 1.16 atm  
 (3) 1.984 atm (4) 6.61 atm
343. Van't Hoff factor is 1.92 for  $\text{MgI}_2$  solution with concentration 0.2M then the degree of dissociation of salt at this concentration is :-  
 (1) 46% (2) 96%  
 (3) 30.67% (4) 64%

344. The vapour pressure of any liquid shows following change with temperature :-  
 (1) Exponential increase  
 (2) exponential decrease  
 (3) Linear increase  
 (4) Linear decrease
345. During evaporation :-  
 (1) Cooling of liquid occurs  
 (2) Heating of liquid occurs  
 (3) Viscosity of liquid decreases  
 (4) Viscosity of liquid increases
346. The composition of gaseous mixture used by scuba divers is :-  
 (1) 79%  $N_2$ , 21%  $O_2$   
 (2) 70.1%  $N_2$ , 22.2%  $O_2$ , 7.7% He  
 (3) 56.2%  $N_2$ , 32.1%  $O_2$ , 11.7 % He  
 (4) 32.1 %  $N_2$ , 56.1 %  $O_2$ , 11.8 % He
347. The solubility of gases in liquid is maximum at :-  
 (1) Low temperature and low pressure  
 (2) Low temperature and high pressure  
 (3) High temperature and high pressure  
 (4) High temperature and low pressure
348. If solubility of vinyl chloride (g) is 0.09 M at STP then value of Henry's constant will be :-  
 (1) 0.0016 bar (2) 617.284 bar  
 (3)  $6.17 \times 10^{-2}$  bar (4) 308.642 bar
349. Which of the following statement is incorrect :-  
 (1) In solution of volatile liquids partial pressure of any component is directly proportional to its mole fraction in solution.  
 (2) In closed container, in equilibrium of two volatile liquids and their vapour, mole fraction of more volatile component is higher in vapour phase.  
 (3) Total vapour pressure of solution of binary volatile liquids, decreases on increasing mole fraction of any component.  
 (4) Raoult's law is a special case of Henry's law in which the values of  $K_H$  and  $p^\circ$  are identical
350. What will be the osmotic pressure of 0.03 N solution of Aluminium sulphate solution at  $27^\circ\text{C}$  ? If in solution salt dissociates 90% :-  
 (1) 0.566 atm (2) 0.677 atm  
 (3) 3.399 atm (4) 4.065 atm
351. What will be the amount of ice separated on cooling solution of 40g ethylene glycol in 400 g water upto  $-9.3^\circ\text{C}$  ? ( $K_f$  for water is  $1.86\text{ K Kg mol}^{-1}$ ) :-  
 (1) 177.78 g (2) 129.03 g  
 (3) 222.22 g (4) 270.97 g
352. Which one of the following solution has maximum vapour pressure at  $27^\circ\text{C}$  temperature ?  
 (1) 1M  $Na_2SO_4$  (2) 1 M  $AlCl_3$   
 (3) 1M  $KBr$  (4) 1M  $MgCl_2$
353. At 298 K,  $1000\text{ cm}^3$  of a solution containing 4.34 g of solute shows osmotic pressure of 2.55 atm. What is the molar mass of solute? ( $R = 0.0821\text{ L atm K}^{-1}\text{ mol}^{-1}$ )  
 (1) 41.64 g  $\text{mol}^{-1}$  (2) 82.73 g  $\text{mol}^{-1}$   
 (3) 58.31 g  $\text{mol}^{-1}$  (4) 91.65 g  $\text{mol}^{-1}$
354. Which of the following will have maximum depression in freezing point?  
 (1) 0.5 M  $Li_2SO_4$   
 (2) 1M  $KCl$   
 (3) 0.5 M  $BaCl_2$   
 (4) 1M  $Al_2(SO_4)_3$
355. 1.00 g of a non electrolyte solute is dissolved in 50g of benzene which lowers the freezing point of benzene by 0.40K. The freezing point depression constant of benzene is  $5.12\text{ K kg mol}^{-1}$ . Find the molar mass of the solute  
 (1) 206 g  $\text{mol}^{-1}$  (2) 226 g  $\text{mol}^{-1}$   
 (3) 246 g  $\text{mol}^{-1}$  (4) 256 g  $\text{mol}^{-1}$
356. At  $40^\circ\text{C}$  the vapour pressure of pure benzene and toluene are 160 mmHg and 60 mmHg respectively. If equimolar above liquids are mixed at same temperature to form an ideal solution. Then vapour pressure of solution will be  
 (1) 140 mm of Hg  
 (2) 110 mm of Hg  
 (3) 220 mm of Hg  
 (4) 100 mm of Hg
357. Dissolving 120 g of urea (mol wt = 60) in 1000 g of water gave a solution of density  $1.15\text{ g mL}^{-1}$ . The molarity of the solution is  
 (1) 1.78 M (2) 2.00 M  
 (3) 2.05 M (4) 2.22 M

358. A binary liquid solution is prepared by mixing n-heptane and ethanol which one of the following statement is correct regarding the behaviour of the solution?

- (1) the solution formed is an ideal solution
- (2) the solution is non-ideal, showing positive deviation from Raoult's law
- (3) the solution is non ideal showing negative deviation from Raoult's law
- (4) n-heptane shows positive deviation while ethanol shows negative deviation from Raoult's law

359. What is the g-molecular mass of a nonionizing solid if 10 g of this solid dissolved in 100 g of water, forms a solution which froze at  $-1.22^{\circ}\text{C}$ ? ( $K_f = 1.86 \text{ K kg mol}^{-1}$ )

- (1) 265 g/mol
- (2) 152 g/mol
- (3) 130g/mol
- (4) 65g/mol

360. At 293 K, vapour pressure of pure benzene is 75 mm of Hg and that of pure toluene is 22 mm of Hg. The vapour pressure of the solution which contains 20 mol% benzene and 80 mol % toluene is

- (1) 32.6 mm Hg
- (2) 64.4 mm Hg
- (3) 97 mm Hg
- (4) 3.26 mm Hg

361. The vapour pressure of pure liquid solvent is 0.80 atm. When a non-volatile substance (Z) is added to the solvent, its vapour pressure drops to 0.6 atm. What the mole fraction of the substance (Z) in the solution

- (1) 0.75
- (2) 0.50
- (3) 0.25
- (4) 0.33

362. What will be normality of 20V  $\text{H}_2\text{O}_2$  solution?

- (1) 1.78 N
- (2) 3.56 N
- (3) 10N
- (4) 0.28 N

363. Which of the following solution have highest boiling point. (Assume all salts completely dissociates)

- (1) 0.1M  $\text{Al}_2(\text{SO}_4)_3$
- (2) 0.1M  $\text{BaCl}_2$
- (3) 0.1M glucose
- (4) 0.1M  $\text{AlCl}_3$

364. What will be the freezing point (in  $^{\circ}\text{C}$ ) of solution obtained by dissolving 0.1 g potassium ferricyanide (mol wt = 329) in 100 g water. If  $K_f$  for water is  $1.86 \text{ K kg mol}^{-1}$

- (1)  $-2.3 \times 10^{-2}$
- (2)  $-5.7 \times 10^{-2}$
- (3)  $-5.7 \times 10^{-3}$
- (4)  $-1.2 \times 10^{-2}$

365. The van't Hoff factor for 0.1M  $\text{Ba}(\text{NO}_3)_2$  solution is 2.74. The degree of dissociation is

- (1) 91.3%
- (2) 87%
- (3) 100%
- (4) 74%

366. A solution of a substance containing 1.05 g per 100 mL was found to be isotonic with 3% glucose solution. The molecular mass of substance is

- (1) 31.5
- (2) 6.3
- (3) 630
- (4) 63

367. The vapour pressure of benzene at  $90^{\circ}\text{C}$  is 1020 torr. A solution of 5g of a solute in 58.5 g benzene has vapour pressure 990 torr. The molecular mass of the solute is

- (1) 78.2
- (2) 178.2
- (3) 200
- (4) 220

368. Which of the following has minimum freezing point

- (1) 0.1M  $\text{K}_2\text{Cr}_2\text{O}_7$
- (2) 0.1M  $\text{NH}_4\text{Cl}$
- (3) 0.1M  $\text{BaSO}_4$
- (4) 0.1M  $\text{Al}_2(\text{SO}_4)_3$

369. What is the correct sequence of osmotic pressure of 0.01 M aq solution of

- (a)  $\text{Al}_2(\text{SO}_4)_3$  ( $\pi_1$ )
- (b)  $\text{Na}_3\text{PO}_4$  ( $\pi_2$ )
- (c)  $\text{BaCl}_2$  ( $\pi_3$ )
- (d) Glucose ( $\pi_4$ )

Choose the correct option.

- (1)  $\pi_4 > \pi_2 > \pi_3 > \pi_1$
- (2)  $\pi_3 > \pi_4 > \pi_2 > \pi_1$
- (3)  $\pi_3 > \pi_4 > \pi_1 > \pi_2$
- (4)  $\pi_1 > \pi_2 > \pi_3 > \pi_4$

### CHEMICAL KINETICS

370. Which of the following rate law expression represent zero order reaction :-

- (1)  $k[\text{A}]^{3/2} [\text{B}]^{-1} [\text{C}]^{1/2}$
- (2)  $k[\text{A}]^0 [\text{B}]^2$
- (3)  $k[\text{A}]^{1/2} [\text{B}]^{1/2} [\text{C}]^{-1}$
- (4)  $k[\text{A}]^2 [\text{B}]^1$

371. The ratio of  $t_{0.75}$  and  $t_{0.5}$  for first order reaction :-

- (1) 4 : 3
- (2) 3 : 2
- (3) 2 : 1
- (4) 1 : 2

372. The correct expression for Arrhenius equation:-

- (1)  $\ln k = \ln A - \frac{E}{RT}$
- (2)  $k e^{-E/RT} = A$
- (3)  $\frac{1}{2.303} \log k - \log A - 2.303 \frac{E}{RT}$
- (4)  $K = A^{-1} e^{-E/RT}$

373. For every  $10^{\circ}\text{C}$  increase in temperature the rate becomes twice so the temperature increase from  $10^{\circ}\text{C}$  to  $100^{\circ}\text{C}$  then rate becomes .... times :-

- (1) 400
- (2) 512
- (3) 112
- (4) 614

374. The specific rate of reaction for the first order reaction depends up on :-

- (1) pressure
- (2) temperature
- (3) concentration of reaction
- (4) concentration of the product

375. The rate constant for zero order reaction is  $3 \times 10^{-2} \text{ mol}^{-1} \text{ L} \cdot \text{sec}^{-1}$ . After 25 sec. If the concentration of reactant is 0.5M then initial concentration of the reactant is :-

- (1) 1 M
- (2) 1.25 M
- (3) 0.5 M
- (4) 0.75

376. The plot of  $\ln K$  versus  $\frac{1}{T}$  is linear with slope of :-

- (1)  $-\frac{E_a}{R}$
- (2)  $+\frac{E_a}{R}$
- (3)  $-\frac{E_a}{2.303R}$
- (4)  $+\frac{E_a}{2.303R}$

377. For a first order gaseous reaction  $A \rightarrow 2B + C$ , initial pressure is  $P_i$  and total pressure of after time 't' is  $P_t$  then expression of K Rate constant:-

$$(1) K = \frac{2.303}{t} \log \frac{2P_i}{3P_i - P_t}$$

$$(2) K = \frac{2.303}{t} \log \left( \frac{2P_i}{82P_t - P_i} \right)$$

$$(3) K = \frac{2.303}{t} \log \left( \frac{P_i}{P_i - P_t} \right)$$

(4) None of these

378. In a reaction  $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$  rate of appearance of  $NH_3$  is  $2.5 \times 10^{-4} \text{ mol/sec}$  then rate of reaction and rate of disappearance of  $H_2$  respectively is:-

- (1)  $3.75 \times 10^{-4}$ ,  $1.25 \times 10^{-4}$
- (2)  $1.25 \times 10^{-4}$ ,  $2.5 \times 10^{-4}$
- (3)  $1.25 \times 10^{-4}$ ,  $3.75 \times 10^{-4}$
- (4)  $5 \times 10^{-4}$ ,  $3.75 \times 10^{-4}$

379. Rate of formation of  $SO_3$  in this reaction is  $1.6 \times 10^{-3} \text{ kg/min}$

$2SO_2 + O_2 \rightarrow 2SO_3$  then rate at which  $SO_2$  reacts is:-

- (1)  $1.6 \times 10^{-3} \text{ kg/min}^{-1}$
- (2)  $8 \times 10^{-4} \text{ kg/min}^{-1}$
- (3)  $3.2 \times 10^{-3} \text{ kg min}^{-1}$
- (4)  $1.28 \times 10^{-3} \text{ kg min}^{-1}$

380. Calculate the order of the reaction in A and B.

A	B	Rate
(mol/l)	(mol/l)	
0.05	0.05	$1.2 \times 10^{-3}$
0.10	0.05	$2.4 \times 10^{-3}$
0.05	0.10	$1.2 \times 10^{-3}$
(1) 1 and 0	(2) 1 and 1	
(3) 0 and 1	(4) none of these	

381. The rate law of reaction  $A + 2B \rightarrow \text{product}$  is given by

$r = K(A)^2(B)^1$ . If A is taken in long excess the order of the reaction will be :-

- (1) zero
- (2) 1
- (3) 2
- (4) 3

382. The half life for the first order reaction  $A \rightarrow B + C$  is 24 hrs. starting with 10g of A how many grams of A will remain after 96 hours. :-

- (1) 1.25 g
- (2) 0.63 g
- (3) 1.77 g
- (4) 0.5 g

383. Rate of reaction increase with temperature :-

- (1) of any reaction
- (2) of exothermic reaction
- (3) of endothermic reaction
- (4) of none

384. If concentration reactant is increased by 2 times then K becomes :-

- (1)  $\ell_n \frac{k}{2}$
- (2)  $\frac{k}{2}$
- (3)  $2k$
- (4)  $k$

385. K is rate constant at temp T then value of

$\lim_{T \rightarrow \infty} \log K$  is equal to :-

- (1)  $A/2.303$
- (2) A
- (3)  $2.303 A$
- (4)  $\log A$

386. The activation energy for a chemical reaction depends upto :-

- (1) Temperature
- (2) Nature of reacting species
- (3) Concentration of the reacting species
- (4) Collision frequency

387. For an endothermic reaction, energy of activation is  $E_a$  and enthalpy of reaction is  $\Delta H$  (both of these in KJ/mol) The value of  $E_a$  will be :-

- (1) equal to zero
- (2) less than  $\Delta H$
- (3) equal to  $\Delta H$
- (4) more than  $\Delta H$

388. For a reaction  $r = K(A)^{3/2}$  then unit of rate of reaction and rate constant respectively :-

- (1)  $\text{mol L}^{-1} \text{S}^{-1}$ ,  $\text{mol}^{-1/2} \text{L}^{1/2} \text{S}^{-1}$
- (2)  $\text{mol}^{-1} \text{L}^{-1} \text{S}^{-1}$ ,  $\text{mol}^{-1/2} \text{L}^{1/2} \text{S}^{-1}$
- (3)  $\text{mol L}^{-1} \text{S}^{-1}$ ,  $\text{mol}^{1/2} \text{L}^{1/2} \text{S}^{-1}$
- (4)  $\text{mol}$ ,  $\text{mol}^{1/2} \text{L}^{1/2} \text{S}$

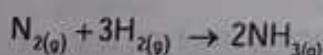
389. The rate of first order reaction is  $1.5 \times 10^{-2} \text{ mol L}^{-1} \text{ min}^{-1}$  at 0.5M concentration of the reactant. The half life of the reaction is :-

- (1) 7.53 min
- (2) 0.383 min
- (3) 23.1 min
- (4) 8.73 min

390. The  $t_{1/2}$  of a reaction is halved as the initial concentration of the reactant is double then order of reaction :-

- (1) 1
- (2) 0
- (3) 2
- (4) 3

391. For this reaction



The relation between  $\frac{d(\text{NH}_3)}{dt}$  and  $-\frac{d(\text{H}_2)}{dt}$  is :-

- (1)  $\frac{d(\text{NH}_3)}{dt} = -\frac{1}{3} \frac{d(\text{H}_2)}{dt}$
- (2)  $+\frac{d(\text{NH}_3)}{dt} = -\frac{2}{3} \frac{d(\text{H}_2)}{dt}$
- (3)  $+\frac{d(\text{NH}_3)}{dt} = -\frac{3}{2} \frac{d(\text{H}_2)}{dt}$
- (4)  $\frac{d(\text{NH}_3)}{dt} = -\frac{d(\text{H}_2)}{dt}$

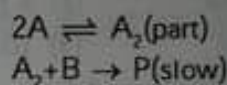
392. Activation energy of the reaction  $\text{A} \rightarrow \text{B} + 38\text{KCal}$  is 20KCal, then activation energy of the reaction  $\text{B} \rightarrow \text{A}$  will be :-

- (1) 20 KCal
- (2) -20KCal
- (3) 18 KCal
- (4) 58KCal

393. For a reaction rate  $= K(A)^{1/2} (B)^2$ . If concentration of A and B are increased by factor of 4 and 2 respectively then rate is changed by the fraction:-

- (1) 4
- (2) 6
- (3) 8
- (4) None of these

394. The reaction  $2\text{A} + \text{B} \rightarrow \text{product}$  follow the mechanism :-



The order of the reaction is

- (1) 1.5
- (2) 3
- (3) 1
- (4) 2

395. Which of following is correct for zero order and first order ( $a \rightarrow$  Initial concentration) :-

- (1)  $t_{1/2} \propto a$ ,  $t_{1/2} \propto \frac{1}{a}$
- (2)  $t_{1/2} \propto a$ ,  $t_{1/2} \propto a^0$
- (3)  $t_{1/2} \propto a^0$ ,  $t_{1/2} \propto a$
- (4)  $t_{1/2} \propto a$ ,  $t_{1/2} \propto \frac{1}{a^2}$

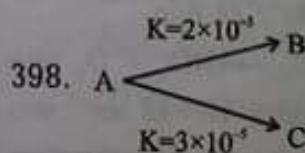
396. Which of following represents the expression

for  $\frac{3}{4}$ th life of first order reaction :-

- (1)  $\frac{K}{2.303} \log \frac{4}{3}$
- (2)  $\frac{2.303}{K} \log \frac{3}{4}$
- (3)  $\frac{2.303}{K} \log 4$
- (4)  $\frac{2.303}{K} \log 3$

397. The rate constant for first order reaction whose half life is 480 sec. :-

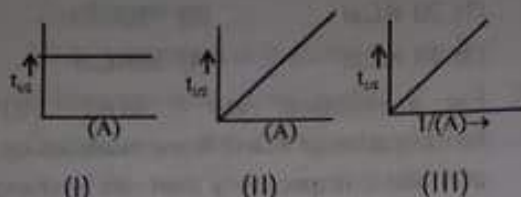
- (1)  $1.44 \times 10^{-3}$
- (2)  $1.44 \text{ sec}^{-1}$
- (3)  $0.72 \times 10^{-3}$
- (4)  $2.88 \times 10^{-3} \text{ sec}^{-3}$



For this parallel first order reaction then find out percentage of B = ? :-

- (1) 40%
- (2) 60%
- (3) 50%
- (4) 90%

399. consider the plots for a reaction  $nA \rightarrow B + C$   
These plots respectively correspond to the reaction order



- (I) 0,1,2 (2) 1,2,3  
(3) 1,0,2 (4) None of these
400. The half life of a first order reaction is 6 hour. How long will it take for the concentration of reactant to change from 0.8 M to 0.25 M?  
(1) 1.07 hour (2) 5.1 hour  
(3) 2.7 hour (4) 10.07 hour
401. The concentration of a reactant in solution decreases from 0.5 M to 0.25 M in 5 hours and from 1.0 M to 0.25 M is 10 hours. The order of the reaction will be  
(1) 2 (2) 1 (3) 3 (4) 0
402. Which of the following is the correct expression for Arrhenius equation?

(1)  $\ln \frac{K_2}{K_1} = \frac{E_a}{R} \left( \frac{1}{T_1} - \frac{1}{T_2} \right)$

(2)  $\log \frac{K_2}{K_1} = \frac{E_a}{2.303} \left( \frac{T_1 T_2}{T_2 - T_1} \right)$

(3)  $\ln \frac{K_2}{K_1} = \frac{E_a}{2.303R} \left( \frac{1}{T_1} - \frac{1}{T_2} \right)$

(4)  $\frac{K_2}{K_1} = \frac{E_a}{2.303R} \left( \frac{T_2 - T_1}{T_1 T_2} \right)$

403. For a first order reaction  $A \rightarrow B$ , the time taken to reduce to 1/4 of initial concentration is 10 min. The time required to reduce to 1/16 of initial concentration will be  
(1) 10 min (2) 20 min  
(3) 4.46 min (4) 2.24 min
404. For the reaction,  $2N_2O_5 \rightarrow 4NO_2 + O_2$  rate and rate constant are  $1.02 \times 10^{-4} \text{ M sec}^{-1}$  and  $3.4 \times 10^{-5} \text{ sec}^{-1}$  respectively, the concentration of  $N_2O_5$  at that time will be  
(1) 1.732 M (2) 3M  
(3)  $1.02 \times 10^{-4} \text{ M}$  (4)  $3.5 \times 10^5 \text{ M}$

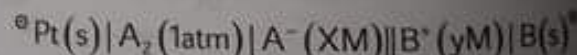
405. For the reaction  $N_2O_5(g) \rightarrow N_2O_4(g) + \frac{1}{2}O_2(g)$  initial pressure is 114 mm and after 20 seconds the pressure of reaction mixture becomes 111 mm then the average rate of reaction will be  
(1)  $1.9 \text{ atm S}^{-1}$  (2)  $8.75 \times 10^{-3} \text{ atm S}^{-1}$   
(3)  $2.5 \times 10^{-3} \text{ atm S}^{-1}$  (4)  $6.65 \text{ atm S}^{-1}$
406. Reaction  $A + B \rightarrow C + D$  is started with 1M of each A and B and follows the rate law  
 $r = k[A]^{1/2}[B]^{1/2}$

What is the time taken for the concentration of A to drop to 0.1M ( $K = 2.303 \times 10^{-3} \text{ sec}^{-1}$ )

- (1) 57 sec (2) 100 sec  
(3) 434 sec (4) 1000 sec
407. 75% of a first order reaction was found to complete in 32 minute. When will 50% of the same reaction will complete  
(1) 24 min (2) 16 min  
(3) 8 min (4) 4 min
408. Half lives of a first order and zero order are same. Then the ratio of the initial rates of the first order reaction to that of zero order reaction is [initial conc. of reactant = 1 Molar]  
(1) 1/0.693 (2)  $2 \times 0.693$   
(3) 2/0.693 (4) 6.93
409. The rate of reaction is expressed  
$$+\frac{1}{2} \frac{d[C]}{dt} = -\frac{1}{3} \frac{d[D]}{dt} = +\frac{1}{4} \frac{d[A]}{dt} = -\frac{d[B]}{dt}$$
  
the reaction is  
(1)  $4A + B \rightarrow 2C + 3D$   
(2)  $B + 3D \rightarrow 4A + 2C$   
(3)  $A + B \rightarrow C + D$   
(4)  $B + D \rightarrow A + C$

## ELECTROCHEMISTRY

410. A hypothetical electrochemical cell is shown below



The emf measured is 0.30V The cell reaction is :-

- (1)  $\text{A}_2 + 2\text{B}^+ \rightarrow 2\text{A}^- + 2\text{B}$   
(2)  $\text{A}_2 + 2\text{e}^- \rightarrow 2\text{A}^-$ ;  $2\text{B}^+ + 2\text{e}^- \rightarrow 2\text{B}$   
(3) The cell reaction cannot be predicted  
(4)  $2\text{A}^- + 2\text{B}^+ \rightarrow \text{A}_2 + 2\text{B}$
411. If  $E_{\text{A}^{+2}/\text{A}}^{\circ} = -0.30 \text{ V}$  and  $E_{\text{A}^{+3}/\text{A}^{+2}}^{\circ} = 0.40 \text{ V}$ , the standard Emf of the reaction :  $\text{A} + 2\text{A}^{+3} \rightarrow 3\text{A}^{+2}$  will be :-  
(1) 0.30 V (2) 0.40 V  
(3) 0.70 V (4) 0.10 V

412. The equilibrium constant of the reaction :  
 $\text{Zn(s)} + 2\text{Ag}^+(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + 2\text{Ag(s)}$  ;  $E^\circ = 1.50\text{V}$   
 at 298 K is  
 (1)  $2.6 \times 10^{48}$  (2)  $8.7 \times 10^{31}$   
 (3)  $6.1 \times 10^{10}$  (4)  $6.6 \times 10^{50}$
413. On the basis of the following  $E^\circ$  values, the strongest oxidising agent is :-  
 $\text{K}^+ + e^- \rightarrow \text{K}$   $E^\circ = -2.923\text{V}$   
 $\text{Mg}^{2+} + 2e^- \rightarrow \text{Mg}$   $E^\circ = -2.337\text{V}$   
 (1)  $\text{K}^+$  (2)  $\text{Mg}^{2+}$   
 (3)  $\text{K}$  (4)  $\text{Mg}$
414. The equivalent conductance of  $\frac{M}{20}$  solution of a weak monobasic acid is 10 mhos  $\text{cm}^2$  and at infinite dilution is 200 mhos  $\text{cm}^2$ . The dissociation constant of this acid is :-  
 (1)  $1.25 \times 10^{-4}$  (2)  $1.25 \times 10^{-5}$   
 (3)  $1.25 \times 10^{-6}$  (4)  $6.26 \times 10^{-4}$
415. Given  $\text{Fe}^{2+} + 2e^- \rightarrow \text{Fe(s)}$   $E^\circ = -0.447\text{V}$   
 $\text{Fe}^{3+} + e^- \rightarrow \text{Fe}^{2+}$   $E^\circ = -0.771\text{V}$   
 Find  $E^\circ$  for the reaction  $\text{Fe}^{3+} + 3e^- \rightarrow \text{Fe(s)}$   
 (1) 0.34 V (2) -0.041V  
 (3) +0.39 V (4) -0.47 V
416. An increase in molar conductance of a strong electrolyte with dilution is mainly due to :-  
 (1) Increase in number of ions  
 (2) Increase in ionic mobility of ions  
 (3) 100% ionisation of electrolyte at normal dilution  
 (4) Increase in both i.e. number of ions and ionic mobility of ions.
417. For the reduction of silver ions with copper metals, the standard cell potential was found to be + 0.40 V at 25°C. The value of standard Gibbs energy  $\Delta G^\circ$  will be ( $F = 96500\text{ C mol}^{-1}$ ):-  
 (1) -70 KJ (2) -77.2 KJ  
 (3) -88 KJ (4) +90KJ
418. Which relation of emf of a electrochemical cell is correct :-  
 (1) emf of cell = oxidation potential of anode - reduction potential of cathode  
 (2) emf of cell = oxidation potential of anode + reduction potential of cathode  
 (3) emf of cell = reduction potential of anode + reduction potential of cathode  
 (4) All of these
419. Which of the following expression correctly represents the equivalent conductance at infinite dilution of  $\text{Ca}_3(\text{PO}_4)_2$ . Given  $\Lambda_{\text{Ca}^{2+}}^\circ$  and  $\Lambda_{\text{PO}_4^{3-}}^\circ$  are the equivalent conductance at infinite dilution of the respective ions :-  
 (1)  $\Lambda_{\text{Ca}^{2+}}^\circ + \Lambda_{\text{PO}_4^{3-}}^\circ$  (2)  $(\Lambda_{\text{Ca}^{2+}}^\circ + \Lambda_{\text{PO}_4^{3-}}^\circ) \times 6$   
 (3)  $\frac{1}{2}\Lambda_{\text{Ca}^{2+}}^\circ + \frac{1}{3}\Lambda_{\text{PO}_4^{3-}}^\circ$  (4)  $3\Lambda_{\text{Ca}^{2+}}^\circ + 2\Lambda_{\text{PO}_4^{3-}}^\circ$
420. If the  $E_{\text{cell}}^\circ$  for a given reaction has a positive value, then which of the following gives the correct relationship for the values of  $\Delta G^\circ$  and  $K_{\text{eq}}$ :-  
 (1)  $\Delta G^\circ < 0$  ;  $K_{\text{eq}} < 1$  (2)  $\Delta G^\circ > 0$  ;  $K_{\text{eq}} > 1$   
 (3)  $\Delta G^\circ > 0$  ;  $K_{\text{eq}} < 1$  (4)  $\Delta G^\circ < 0$  ;  $K_{\text{eq}} > 1$
421. Standard electrode potential  $\text{Au}^{3+}/\text{Au}$  couple is 1.428 V and that for  $\text{Na}^+/\text{Na}$  couple is -2.714 V. These two couples in their standard state are connected to make a cell. The cell potential will be :-  
 (1) 4.142 (2) 1.286 v  
 (3) -1.286 v (4) 3.376 v
422. Standard electrode potential of three metals A, B and C are -1.5V, 0.8V and -2.7V respectively. The reducing power of these metals will be :-  
 (1)  $B > C > A$  (2)  $B > A > C$   
 (3)  $C > A > B$  (4)  $A > B > C$
423. A solution contains  $\text{Cr}^{2+}$ ,  $\text{Cr}^{3+}$  and  $\text{I}^-$  ions. This solution was treated with iodine at 35°C.  $E^\circ$  for  $\text{Cr}^{3+}/\text{Cr}^{2+}$  is -0.41V and  $E^\circ$  for  $\text{I}_2/2\text{I}^-$  = 0.536V. The favourable redox reaction is :-  
 (1)  $\text{Cr}^{2+}$  will be oxidised to  $\text{Cr}^{3+}$   
 (2)  $\text{Cr}^{3+}$  will reduced to  $\text{Cr}^{2+}$   
 (3) There will be no redox reaction  
 (4)  $\text{I}^-$  will oxidised to  $\text{I}_2$
424. Limiting molar conductivity of  $\text{CH}_3\text{COOH}$  (i.e.  $\Lambda_{\text{m}(\text{CH}_3\text{COOH})}^\circ$ ) is equal to :-  
 (1)  $\Lambda_{\text{m}(\text{CH}_3\text{COOH})}^\circ + \Lambda_{\text{m}(\text{CH}_3\text{COONa})}^\circ - \Lambda_{\text{m}(\text{NaOH})}^\circ$   
 (2)  $\Lambda_{\text{m}(\text{CH}_3\text{COONa})}^\circ + \Lambda_{\text{m}(\text{HCl})}^\circ - \Lambda_{\text{m}(\text{NaCl})}^\circ$   
 (3)  $\Lambda_{\text{m}(\text{CH}_3\text{COONa})}^\circ + \Lambda_{\text{m}(\text{NaCl})}^\circ - \Lambda_{\text{m}(\text{NaOH})}^\circ$   
 (4)  $\Lambda_{\text{m}(\text{NaOH})}^\circ + \Lambda_{\text{m}(\text{NaCl})}^\circ - \Lambda_{\text{m}(\text{CH}_3\text{COONa})}^\circ$

425. (a)  $\text{H}_2\text{O}_2 + \text{O}_3 \rightarrow \text{H}_2\text{O} + 2\text{O}_2$   
 (b)  $\text{H}_2\text{O}_2 + \text{Ag}_2\text{O} \rightarrow 2\text{Ag} + \text{H}_2\text{O} + \text{O}_2$   
 Role of hydrogen peroxide in the above reaction is respectively  
 (1) Oxidising in (a) and reducing in (b)  
 (2) Reducing in (a) and oxidising in (b)  
 (3) Reducing in (a) and (b)  
 (4) Oxidising in (a) and (b)
426. The weight of copper (At wt=63.5) displaced by a quantity of electricity which displaces 5600 ml of  $\text{O}_2$  at STP will be :-  
 (1) 63.5 g (2) 31.5 g  
 (3) 15.875 g (4) 127 g
427. When 0.1 mole  $\text{Cr}_2\text{O}_7^{2-}$  is oxidised then quantity of electricity required to completely oxidise  $\text{Cr}_2\text{O}_7^{2-}$  to  $\text{Cr}^{3+}$  is :-  
 (1) 9650 C (2) 96500 C  
 (3) 57900 C (4) 54900 C
428. A device that converts energy of combustion of fuel like hydrogen and methane directly into electrical energy is known as :-  
 (1) Electrolytic cell (2) Dynamo  
 (3) Ni-Cd cell (4) Fuel cell
429. Aqueous solution of which of the following compounds is the best conductor of electric current :-  
 (1)  $\text{CH}_3\text{COOH}$  (2)  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$   
 (3)  $\text{H}_2\text{C}_2\text{O}_4$  (4)  $\text{NaOH}$
430. The pressure of  $\text{H}_2$  required to make the potential of  $\text{H}_2$ -electrode zero in pure water at  $50^\circ\text{C}$  is :-  
 (1)  $10^{-14}$  (2)  $10^{-7}$   
 (3)  $10^{-14}$  (4)  $10^{-7}$
431. The number of electrons delivered at the cathode during electrolysis by a current of 2 ampere in 120 seconds is (charge on electron =  $1.6 \times 10^{-19}$  C) :-  
 (1)  $3.75 \times 10^{20}$  (2)  $7.48 \times 10^{20}$   
 (3)  $1.5 \times 10^{24}$  (4)  $3 \times 10^{20}$
432. The molar conductivity of a 0.1 mol/dm<sup>3</sup> solution of  $\text{KNO}_3$  with electrolytic conductivity of  $4 \times 10^{-3} \text{ Scm}^{-1}$  at 298 K is :-  
 (1)  $11.52 \text{ Scm}^2 \text{ mol}^{-1}$   
 (2)  $20 \text{ Scm}^2 \text{ mol}^{-1}$   
 (3)  $40 \text{ Scm}^2 \text{ mol}^{-1}$   
 (4)  $13.48 \text{ Scm}^2 \text{ mol}^{-1}$
433. The resistance of conductivity cell containing 0.001 M KCl solution at 298 K is 1500 ohm. What is the cell constant if the conductivity of 0.001 M KCl solution at 298 K is  $0.146 \times 10^{-3} \text{ S cm}^{-1}$   
 (1)  $0.419 \text{ cm}^{-1}$  (2)  $0.219 \text{ cm}^{-1}$   
 (3)  $0.45 \text{ cm}^{-1}$  (4)  $0.75 \text{ cm}^{-1}$
434. Calculate the  $\Delta G^\circ$  of the following reaction :-  
 $\text{Fe}^{+2}(\text{aq}) + \text{Ag}^+(\text{aq}) \rightarrow \text{Fe}^{+3}(\text{aq}) + \text{Ag}(\text{s})$   
 $E_{\text{Ag}^+/\text{Ag}}^\circ = 0.8 \text{ V}$   $E_{\text{Fe}^{+3}/\text{Fe}^{+2}}^\circ = 0.77 \text{ V}$   
 (1)  $-2895 \text{ J mol}^{-1}$  (2)  $-3845 \text{ J mol}^{-1}$   
 (3)  $-1874 \text{ J mol}^{-1}$  (4)  $-375 \text{ J mol}^{-1}$
435. Calculate the emf of the cell  
 $\text{Fe}(\text{s}) + 2\text{H}^+(1\text{M}) \rightarrow \text{Fe}^{+2}(0.001\text{M}) + \text{H}_2(\text{g}, 1\text{atm})$   
 (Given :  $E_{\text{Fe}^{+2}/\text{Fe}}^\circ = -0.44 \text{ V}$ )  
 (1) 0.215 V (2) 0.38 V  
 (3) -0.48 V (4) 0.3515 V
436. A solution of  $\text{CuSO}_4$  is electrolysed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at the cathode?  
 (Molar mass of Cu = 63.5 g/mol)  
 (1) 0.492g (2) 0.325g  
 (3) 0.873g (4) 0.296g
437. The conductance is the :-  
 (1) Reciprocal of specific resistance  
 (2) Reciprocal of resistance  
 (3) Reciprocal of current  
 (4) Reciprocal of concentration
438. The ion which has lowest ionic mobility in aqueous solution :-  
 (1)  $\text{Li}^+$  (2)  $\text{Na}^+$   
 (3)  $\text{K}^+$  (4)  $\text{Rb}^+$
439. Metals have conductivity in the order of ( $\text{ohm}^{-1} \text{ cm}^{-1}$ ) :-  
 (1)  $10^{12}$  (2)  $10^8$   
 (3)  $10^2$  (4)  $10^{-6}$
440. Zn can displace :-  
 (1)  $\text{Mg}^{+2}$  from its aqueous solution  
 (2)  $\text{Cu}^{+2}$  from its aqueous solution  
 (3)  $\text{Na}^+$  from its aqueous solution  
 (4)  $\text{Al}^{+3}$  from its aqueous solution

441. Which of the following is incorrect regarding salt bridge solution ?  
 (1) Solution must be strong electrolyte  
 (2) Solution should be inert towards both electrodes  
 (3) Size of cation and anions of salt should be much different  
 (4) Salt bridge solution is prepared in gelatin or agar-agar to make it semi solid.
442. Cell reaction during discharging of lead storage battery at cathode is :-  
 (1)  $\text{Pb} + \text{SO}_4^{2-} - 2e^- \rightarrow \text{PbSO}_4$   
 (2)  $\text{PbSO}_4 + 2e^- \rightarrow \text{Pb} + \text{SO}_4^{2-}$   
 (3)  $\text{PbO}_2 + \text{SO}_4^{2-} + 4\text{H}^+ + 2e^- \rightarrow \text{PbSO}_4 + 2\text{H}_2\text{O}$   
 (4)  $\text{PbSO}_4 + 2\text{H}_2\text{O} \rightarrow \text{PbO}_2 + \text{SO}_4^{2-} + 4\text{H}^+ + 2e^-$
443. The efficiency of fuel cell is given by :-  
 (1)  $\frac{\Delta G}{\Delta S}$  (2)  $\frac{\Delta G}{\Delta H}$  (3)  $\frac{\Delta S}{\Delta G}$  (4)  $\frac{\Delta H}{\Delta G}$
444. In electrolysis of NaCl when Pt electrode is taken then  $\text{H}_2$  is liberated at cathode while with Hg cathode it forms sodium amalgam :-  
 (1) Hg is more inert than Pt  
 (2) Na is dissolved in Hg while it does not dissolve in Pt  
 (3) More voltage is required to reduce  $\text{H}^+$  at Hg than at Pt  
 (4) Concentration of  $\text{H}^+$  ions is larger when Pt electrode is taken
445. The minimum equivalent conductance in fused state is shown by :-  
 (1)  $\text{MgCl}_2$  (2)  $\text{BeCl}_2$   
 (3)  $\text{CaCl}_2$  (4)  $\text{SrCl}_2$
446. The metal that cannot be produced on reduction of its oxide by aluminium is :-  
 (1) K (2) Mn (3) Cr (4) Fe
447. Rust is a mixture of :-  
 (1)  $\text{FeO}$ ,  $\text{Fe(OH)}_2$  (2)  $\text{FeO}$ ,  $\text{Fe(OH)}_3$   
 (3)  $\text{Fe}_2\text{O}_3$ ,  $\text{Fe(OH)}_3$  (4)  $\text{Fe}_3\text{O}_4$ ,  $\text{Fe(OH)}_3$
448. Which metal will dissolve if the cell works  $\text{Cu}|\text{Cu}^{2+}||\text{Ag}^+|\text{Ag}$ :-  
 (1) Cu (2) Ag  
 (3) Both A & B (4) None of these
449. The approximate emf of a dry cell's:-  
 (1) 2V (2) 1.2V (3) 6V (4) 1.5V
450. When lead storage battery is charged it acts as :-  
 (1) Fuel cell (2) Electrolytic cell  
 (3) Galvanic cell (4) Concentration cell
451. The zinc acts as sacrificial or cathodic protection to prevent rusting of iron because :-  
 (1)  $E_{\text{op}}^\circ$  of Zn <  $E_{\text{op}}^\circ$  of Fe  
 (2)  $E_{\text{op}}^\circ$  of Zn >  $E_{\text{op}}^\circ$  of Fe  
 (3)  $E_{\text{op}}^\circ$  of Zn =  $E_{\text{op}}^\circ$  of Fe  
 (4) Zn is cheaper than Fe
452. The molar conductivity of 0.01 M solution of weak acid is  $16.6 \Omega^{-1} \text{cm}^2 \text{mol}^{-1}$ . Its molar conductivity at infinite dilution is  $390.7 \Omega^{-1} \text{cm}^2 \text{mol}^{-1}$ . The degree of dissociation of weak acid is  
 (1) 0.24 (2) 0.42 (3) 0.042 (4) 0.024
453. The strongest oxidising agent among the species having SRP values of  $\text{In}^{+3}$  ( $E^\circ = -1.34 \text{ V}$ ),  $\text{Au}^{+3}$  ( $E^\circ = 1.4 \text{ V}$ ),  $\text{Hg}^{+2}$  ( $E^\circ = 0.86 \text{ V}$ ) and  $\text{Cr}^{+3}$  ( $E^\circ = -0.74 \text{ V}$ ) is  
 (1)  $\text{Cr}^{+3}$  (2)  $\text{Au}^{+3}$  (3)  $\text{Hg}^{+2}$  (4)  $\text{In}^{+3}$
454. Given the standard electrode potential  
 (a)  $\text{K}^+/\text{K} = -3.02 \text{ V}$   
 (b)  $\text{Cu}^{+2}/\text{Cu} = +0.34 \text{ V}$   
 (c)  $\text{Hg}^{+2}/\text{Hg} = 0.92 \text{ V}$   
 (d)  $\text{Cr}^{+3}/\text{Cr} = -0.74 \text{ V}$   
 Decreasing order of reducing power of these element is  
 (1)  $a > b > c > d$  (2)  $a > d > c > b$   
 (3)  $a > d > b > c$  (4)  $c > b > d > a$
455. Calculate  $E_{\text{cell}}$  of the reaction  
 $\text{Mg(s)} + 2\text{Ag}^+ \rightarrow \text{Mg}^{+2} + 2\text{Ag(s)}$   
 (0.0001M) (0.100M)  
 If  $E_{\text{cell}}^\circ = 3.17 \text{ V}$   
 (1) -2.96 V (2) +2.96V  
 (3) 3.38 V (4) -3.38 V
456. Which of the following statements is correct for an electrolytic cell?  
 (1) electrons flow from cathode to anode through external battery  
 (2) electrons flow from cathode to anode within the electrolytic solution  
 (3) Migration of ions along with oxidation reaction at cathode and reduction reaction at anode  
 (4) migration of ions along with reduction reaction at cathode and oxidation reaction at anode

457. In an electrolysis of acidulated water, 4.48 L of hydrogen at STP was produced by passing a current of 2.14 A. For how many hours was the current passed?  
 (1) 4 (2) 3  
 (3) 6 (4) 5
458. When a dilute aq. solution of  $\text{Li}_2\text{SO}_4$  is electrolysed, the products formed at the anode and cathode are respectively?  
 (1)  $\text{H}_2$  and  $\text{O}_2$  (2)  $\text{O}_2$  and Li  
 (3)  $\text{SO}_2$  and  $\text{H}_2$  (4)  $\text{O}_2$  and  $\text{H}_2$
459. Based on the data given below, the correct order of reducing power is  
 $\text{Fe}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Fe}^{2+}(\text{aq}); E^0 = + 77 \text{ V}$   
 $\text{Al}^{3+}(\text{aq}) + 3\text{e}^- \rightarrow \text{Al}(\text{s}); E^0 = - 1.66 \text{ V}$   
 $\text{Br}_2(\text{aq}) + 2\text{e}^- \rightarrow 2\text{Br}^-(\text{aq}); E^0 = + 1.08 \text{ V}$   
 (1)  $\text{Br}^- < \text{Fe}^{2+} < \text{Al}$   
 (2)  $\text{Fe}^{2+} < \text{Al} < \text{Br}^-$   
 (3)  $\text{Al} < \text{Br}^- < \text{Fe}^{2+}$   
 (4)  $\text{Al} < \text{Fe}^{2+} < \text{Br}^-$
460. How much time is required for complete decomposition of 4 mol water using current of 4 Ampere?  
 (1) 96500 sec (2)  $3.85 \times 10^4 \text{ sec}$   
 (3)  $1.93 \times 10^5 \text{ sec}$  (4)  $2.92 \times 10^5 \text{ sec}$
461. The amount of metal deposited at cathode on passing electric current of 0.75 ampere in aqueous ferric sulphate solution for 30 minutes, will be (atomic weight of Fe = 56)  
 (1) 0.00435 g (2) 0.261 g  
 (3) 0.783 g (4) 0.522 g
462.  $\text{Pt} | \text{H}_2(1\text{atm}) | \text{H}^+(0.001\text{M}) || \text{H}^+(0.1\text{M}) | \text{H}_2(1\text{atm}) | \text{Pt}$   
 what will be the value of  $E_{\text{cell}}$  for this cell  
 (1) 0.1182 V (2) - 0.1182 V  
 (3) 0.0591 V (4) - 0.0591 V
463. Consider the following electrode potentials  
 $\text{Mg}^{2+} + 2\text{e}^- \rightarrow \text{Mg} \quad E^0 = - 2.37\text{V}$   
 $\text{V}^{2+} + 2\text{e}^- \rightarrow \text{V} \quad E^0 = - 1.18 \text{ V}$   
 $\text{Cu}^{2+} + \text{e}^- \rightarrow \text{Cu}^+ \quad E^0 = 0.15 \text{ V}$   
 Which of the following reactions will proceed from left to right spontaneously?  
 (1)  $\text{Mg}^{2+} + \text{V} \rightarrow \text{Mg} + \text{V}^{2+}$   
 (2)  $\text{Mg}^{2+} + 2\text{Cu}^+ \rightarrow \text{Mg} + 2\text{Cu}^{2+}$   
 (3)  $\text{V}^{2+} + 2\text{Cu}^+ \rightarrow \text{V} + 2\text{Cu}^{2+}$   
 (4)  $\text{V} + 2\text{Cu}^{2+} \rightarrow \text{V}^{2+} + 2\text{Cu}^+$
464. A metal bucket is to be electroplated by using  $\text{ZnCl}_2$  as an electrolyte. How many moles of zinc are deposited in 20 min by a constant current of 10A?  
 (1) 0.01 (2) 0.03 (3) 0.06 (4) 0.10
465. The quantity of electricity required to release  $112 \text{ cm}^3$  of hydrogen at STP from acidified water is  
 (1) 0.1F (2) 1F (3) 965C (4) 96500C
466. If  $E^0_{\text{Au}^{3+}/\text{Au}} = 1.69\text{V}$  and  $E^0_{\text{Au}^{+}/\text{Au}} = 1.40\text{V}$  then the value of  $E^0_{\text{Au}^{3+}/\text{Au}^{+}}$  will be  
 (1) 0.19V (2) 2.945 V  
 (3) 1.255 V (4) 1.19 V

## SURFACE

467. Bredig arc method cannot be used to prepare colloidal solution of which of the following :-  
 (1) Pt (2) Ag (3) Au (4) Fe
468. Which one of the following is correctly matched :-  
 (1) Emulsion - curd (2) Foam - mist  
 (3) Aerosol - smoke (4) Solid sol - cake
469. The protecting power of Lyophilic colloidal sol is expressed in terms of :-  
 (1) Coagulation value  
 (2) Gold number  
 (3) Critical micelle concentration  
 (4) Oxidation number
470. According to freundlich adsorption isotherm which of the following is correct ?  
 (1)  $\frac{x}{m} \propto p^0$   
 (2)  $\frac{x}{m} \propto p^{1/n}$   
 (3)  $\frac{x}{m} \propto p^1$   
 (4) All the above are correct for different pressure range
471. Among the electrolytes  $\text{Na}_2\text{SO}_4$ ,  $\text{CaCl}_2$ ,  $\text{Al}_2(\text{SO}_4)_3$  and  $\text{NH}_4\text{Cl}$ , the most effective coagulating agent for  $\text{Sb}_2\text{S}_3$  sol is :-  
 (1)  $\text{Na}_2\text{SO}_4$  (2)  $\text{CaCl}_2$   
 (3)  $\text{Al}_2(\text{SO}_4)_3$  (4)  $\text{NH}_4\text{Cl}$

472. A plot of  $\log x/m$  versus  $\log P$  for the adsorption of a gas on a solid gives a straight line with slope equal to :-

- (1)  $1/n$  (2)  $\log K$  (3)  $-\log K$  (4)  $n$

473. In petrochemical industry, alcohols are directly converted to gasoline by passing over heated :-

- (1) Platinum (2) ZSM-5  
(3) Iron (4) Nickel

474. Which of the following is not a characteristic of chemisorption :-

- (1) Adsorption is irreversible  
(2)  $\Delta H$  is of the order of 40 KJ  
(3) Adsorption is specific  
(4) Adsorption increases with increase of surface area

475. Which of the following is an emulsifier ?

- (1) soap (2) water  
(3) oil (4) NaCl

476. Gold numbers of protective colloids A, B, C and D are 0.50, 0.01, 0.1 and 0.005 respectively. The correct order of their protective power is :-

- (1)  $A < C < B < D$  (2)  $D < A < C < B$   
(3)  $C < B < D < A$  (4)  $B < D < A < C$

477. The process which is catalysed by one of the product is called :-

- (1) Positive catalysis  
(2) Negative catalysis  
(3) Autocatalysis  
(4) None of these

478. Match the column :-

X[Colloids]

Y[Classification]

I Smoke

A Sol

II Gelatin

B Aerosol

III Soap lather

C Emulsion

IV Milk

D Foam

I II III IV

(1) A B C D

(2) A C B D

(3) B A D C

(4) B A C D

479. Some of the following are true solutions :-

I : urea solution

II : Gelation

III : Glucose solution

IV : NaCl solution

V : Butter

VI : Blood

Select true solution :

(1) I, III, IV

(2) II, III, IV, V

(3) I, IV, V

(4) II, IV, VI

480. A freshly prepared  $\text{Fe}(\text{OH})_3$  precipitate is peptized by adding  $\text{FeCl}_3$  solutions. The charge on the colloidal particle is due to preferential adsorption of :-

- (1)  $\text{Cl}^-$  ions  
(2)  $\text{Fe}^{3+}$  ions  
(3)  $\text{OH}^-$  ions  
(4) None of these

481. Match the column :-

	Column-I		Column-II
A	Chemisorption	P	Not specific and decrease with temperature
B	Physisorption	Q	Specific and increases with temperature
C	Desorption of a solute on liquid surface	R	Increases the surface tension of the liquid
D	Adsorption of a solute on a liquid surface	S	Decreases the surface tension of the liquid

- A B C D  
(1) Q P R S  
(2) P Q R S  
(3) S R Q P  
(4) Q S P R

482.

	Column-I		Column-II
A	Liquid dispersed in gas	P	Foam
B	Gas dispersed in liquid	Q	Emulsion
C	Liquid dispersed in solid	R	Aerosol
D	Liquid dispersed in liquid	S	Gel

- A B C D  
(1) R P S Q  
(2) P Q R S  
(3) S R Q P  
(4) Q R P S

	Column-I		Column-II
483.	A Coagulation	P	Due to presence of charge
	B Electrophoresis	Q	Due to scattering of light
	C Tyndall effect	R	Due to neutralization of charge
	D Brownian movement	S	Due to impact of the molecules of the dispersion medium with colloidal particles

- A B C D  
 (1) R P Q S  
 (2) P Q R S  
 (3) S Q P R  
 (4) S P Q R

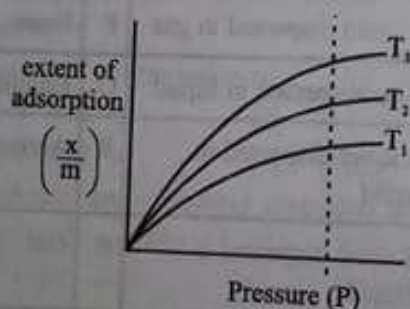
484. Which property of colloids is not dependent on the charge on colloidal particles :-

- (1) Electro osmosis (2) Tyndall effect  
 (3) Coagulation (4) Electrophoresis

485. For the coagulation of 50 ml of ferric hydroxide sol. 10 ml of 0.5 M KCl is required. What is the coagulation value of KCl ?

- (1) 5 (2) 10  
 (3) 100 (4) None of these

486. For the graph below select correct order of temperature :-



- (1)  $T_1 > T_2 > T_3$   
 (2)  $T_2 > T_3 > T_1$   
 (3)  $T_3 > T_2 > T_1$   
 (4)  $T_1 = T_2 = T_3$

487. Which of the following is true in respect of chemical adsorption ?

- (1)  $\Delta H < 0$ ,  $\Delta S > 0$ ,  $\Delta G > 0$   
 (2)  $\Delta H < 0$ ,  $\Delta S < 0$ ,  $\Delta G < 0$   
 (3)  $\Delta H > 0$ ,  $\Delta S > 0$ ,  $\Delta G > 0$   
 (4)  $\Delta H > 0$ ,  $\Delta S < 0$ ,  $\Delta G > 0$

488. Which of the following is negatively charged sol.

- (1) Metallic sulphides  
 (2) Pt  
 (3) Acid dye  
 (4) All of these

489. In freundlich adsorption isotherm the value of  $1/n$  is :-

- (1) 1 in case of physical adsorption  
 (2) 1 in case of chemisorption  
 (3) Between 0 and 1 in all cases  
 (4) Between 2 and 4 in all cases

490. The Langmuir adsorption Isotherm is deduced using the assumption :-

- (1) The adsorption sites are equivalent in their ability to adsorb the particles  
 (2) The heat of adsorption varies with adsorption  
 (3) The adsorption molecule interact with each other  
 (4) The adsorption takes place in multilayers

491. Which of the following factors affects the adsorption of a gas on a solid ?

- (1) Critical temperature ( $T_c$ )  
 (2) Temperature of gas  
 (3) Pressure of gas  
 (4) All of these

492. As the temperature of the solid surface increases, the extent of physisorption of a gas

- (1) increases  
 (2) decreases  
 (3) first increases then decreases  
 (4) remains unchanged

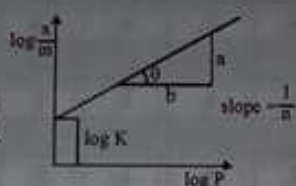
493. Match the expression given in the column-I with the graphs or statement given in the column-II and select the correct option from the codes given below

Column-I

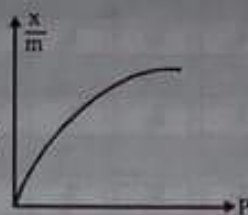
Column-II

(A)  $\frac{x}{m} \propto \sqrt{s} P$

(P)



(B)  $\log \frac{x}{m} \propto \sqrt{s} \log P$  (Q)



(C)  $\frac{x}{m} = KC^{1/n}$

(R) Adsorption from solution phase

Codes

	A	B	C
(1)	P	Q	R
(2)	Q	P	R
(3)	R	P	Q
(4)	R	Q	P

494. Which of the following is purification method of colloidal solution?

- (1) Coagulation (2) Ultrafiltration  
(3) Electrophoresis (4) Tyndal effect

495. Which of the following statements is incorrect regarding physisorption?

- (1) It occurs because of van der Waal's force  
(2) easily liquefiable gases are adsorbed readily  
(3) under high pressure it results into multilayered adsorption on adsorbent surface  
(4) Enthalpy of adsorption is low and positive

496. When the temperature is lowered and pressure is raised, the adsorption of a gas on a solid

- (1) decreases  
(2) increases  
(3) remains unaffected  
(4) decreases first then increases

497. The heat evolved in physisorption lies in the range (in kJ/mol) of

- (1) 20-40 (2) 40-100  
(3) 100-200 (4) 200-400

## PHYSICAL CHEMISTRY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	3	1	2	2	2	2	1	4	3	2	1	1	1	3	1
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	4	1	3	3	1	3	4	4	2	2	3	1	2	3	4
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	2	2	2	1	1	1	4	4	4	1	1	2	1	2	2
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	3	2	2	4	4	1	2	3	4	1	2	3	4	4	1
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	1	4	4	3	2	4	3	4	2	1	3	1	2	2	1
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans.	3	1	3	1	2	4	3	3	2	1	3	4	1	1	2
Que.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Ans.	2	3	3	3	2	3	4	3	3	3	4	2	3	2	2
Que.	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	2	3	4	2	1	1	1	2	3	4	3	4	3	4	3
Que.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
Ans.	2	1	2	1	3	3	3	3	2	1	4	2	2	1	2
Que.	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
Ans.	4	3	4	4	4	1	2	3	4	1	2	3	1	3	2
Que.	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165
Ans.	1	1	4	1	1	3	1	3	4	1	4	4	1	2	3
Que.	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans.	4	3	1	4	4	2	2	2	3	4	3	3	1	2	1
Que.	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195
Ans.	2	1	2	2	1	1	3	3	3	4	3	3	1	2	2
Que.	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210
Ans.	4	2	3	2	4	3	3	2	4	2	2	2	3	4	1
Que.	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
Ans.	2	4	1	2	1	3	2	1	1	2	1	2	3	3	2
Que.	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
Ans.	2	3	1	3	3	4	4	2	1	1	3	4	4	2	3
Que.	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
Ans.	4	1	2	1	1	3	2	3	2	2	3	2	4	1	3
Que.	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
Ans.	4	1	3	1	3	3	1	2	4	3	4	2	1	1	4
Que.	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285
Ans.	3	1	4	2	4	3	4	3	3	2	3	1	4	1	1
Que.	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Ans.	2	4	3	2	2	3	2	2	2	2	4	4	3	3	3
Que.	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315
Ans.	3	4	4	2	1	3	4	2	3	4	2	3	4	4	4
Que.	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330
Ans.	2	2	3	4	2	3	2	2	2	1	3	4	3	1	2
Que.	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345
Ans.	3	2	4	3	3	2	4	3	4	2	3	1	1	1	1

Que.	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
Ans.	3	2	2	3	1	4	3	1	4	4	2	3	2	2	1
Que.	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375
Ans.	3	2	1	1	2	4	4	4	4	3	3	1	2	2	2
Que.	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390
Ans.	1	1	3	4	1	2	2	1	4	2	2	4	1	3	3
Que.	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405
Ans.	2	4	3	2	2	3	1	1	3	4	2	1	2	2	3
Que.	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420
Ans.	4	2	2	2	4	3	4	2	1	2	2	2	2	1	4
Que.	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435
Ans.	1	3	1	2	3	2	3	4	4	1	3	3	2	1	4
Que.	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450
Ans.	4	2	1	2	2	3	3	2	3	2	1	3	1	4	2
Que.	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465
Ans.	2	3	2	3	2	4	4	4	1	3	2	1	4	3	3
Que.	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480
Ans.	3	4	3	2	4	3	1	2	2	1	1	3	3	1	2
Que.	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495
Ans.	1	1	1	2	3	1	2	4	3	1	4	2	2	2	4
Que.	496	497													
Ans.	2	1													

## PHYSICAL CHEMISTRY

## MOLE CONCEPT

1. Neutrons in 1 molecule of
- $H_2O = 8$

$$\text{no. of moles in 1.8 ml} = \frac{1.8}{18} = 0.1$$

$$\text{no. of molecules} = 0.1 \times N_A$$

$$\text{no. of neutrons} = 8 \times 0.1 \times N_A$$

$$\text{no. of moles of neutrons} = \frac{8 \times 0.1 \times N_A}{N_A} = 0.8$$

- 2.
- $PV = nRT$

$$\frac{2 \times 350}{1000} = \frac{1}{M_w} \times 0.082 \times 273$$

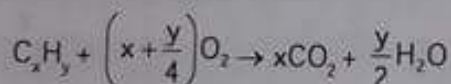
$$M_w = 32$$

$$\text{wt of 1 molecule of diatomic molecule } A_2 = \frac{32}{N_A}$$

wt of 1 atom of diatomic molecule

$$A_2 = \frac{32}{N_A} \times \frac{1}{2} = \frac{16}{N_A}$$

3. for unknown hydrocarbon



$$1\text{ mL} \quad \quad \quad x\text{ mL} \quad \quad \quad \frac{y}{2}\text{ mL}$$

$$10\text{ mL} \quad \quad \quad 10x\text{ mL} \quad \quad \quad 10\frac{y}{2}\text{ mL}$$

$$10x = 20 \text{ and } 10\frac{y}{2} = 30 \text{ Hence formula is } C_2H_6$$

$$x = 2 \quad \quad y = 6$$

- 4.
- $A + 2B \rightarrow C$

Hence B is limiting reagent

2 mole B produce 1 mole C  
and 8 mole B produce 4 mole C

- 5.
- $1 \text{ a.m.u} = \frac{1}{12} \times \text{wt of C-12 isotope}$

$$1 \text{ a.m.u} = \frac{1}{24} \times \text{wt of C-12 isotope}$$

$$1 \text{ amu} = 2 \times 1 \text{ amu}^1$$

$$\text{New amu}^1 = \frac{\text{amu}}{2}$$

Hence to maintain the weight of 1 mole, value of Avogadro constant gets doubled

Let abundance of B-10 be  $x$  and B-11 be  $100-x$

Avg. mass =

$$\frac{M_1x_1 + M_2x_2}{x_1 + x_2} \rightarrow \frac{(10 \times x) + [11 \times (100 - x)]}{100} = 10.8$$

$$\Rightarrow x = 20$$

- 7.

Atom	atomic mass	% wt	% / Atomic wt.	simple ratio
C	12	54.54	4.54	2
H	1	9.09	9.09	4
O	16	36.37	2.27	1

Empirical formula =  $C_2H_4O$ 

Empirical formula weight = 44

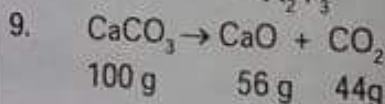
Molecular formula weight =  $88 \times 2 = 176$ 

$$n = \frac{176}{44} = 4$$

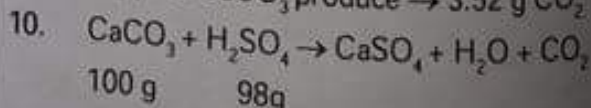
Hence molecular formula =  $C_8H_{16}O_4$ 

$$8. \text{ Formula} = X \frac{76}{75} Y \frac{24}{16}$$

$$= X_2Y_3$$



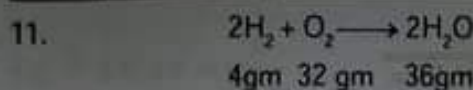
$$\text{wt of pure limestone} = \frac{20 \times 40}{100} = 8 \text{ gm}$$

100 gm pure  $\text{CaCO}_3$  produce  $\rightarrow 44 \text{ g CO}_2$ 8 g pure  $\text{CaCO}_3$  produce  $\rightarrow 3.52 \text{ g CO}_2$ 100 g  $\text{CaCO}_3$  require 98 gm  $\text{H}_2\text{SO}_4$ 

$$25 \text{ g CaCO}_3 \text{ require } \frac{98}{100} \times 25 \text{ gm pure H}_2\text{SO}_4$$

$$= 24.5 \text{ g pure H}_2\text{SO}_4$$

Hence, wt of 50% pure  $\text{H}_2\text{SO}_4$  will be 49.5 gm



given 8gm 32 gm

Hence,  $\text{O}_2$  is limiting reagent

12.  $\% \text{ wt} = \frac{\text{Atomic} \times \text{Atomic wt}}{\text{molecular wt}} \times 100$

If minimum molecular wt is to be found then take atomicity = 1

$$3.4 = \frac{1 \times 32 \times 100}{\text{min. molecular wt}}$$

$$\Rightarrow \text{Minimum molecular wt} = 941.176$$

13. (i) No. of molecules =  $\frac{15}{22.4} \times N_A$

(ii) No. of molecules =  $\frac{5}{22.4} \times N_A$

(iii) No. of molecules =  $\frac{0.5}{2} \times N_A$

(iv) No. of molecules =  $\frac{10}{32} \times N_A$

Hence 15 L  $\text{H}_2$  will have maximum number of molecules

14. Weight of metal chloride = x

weight of metal = y

weight of chlorine = x-y

$$\text{Equivalent weight} = \frac{\text{weight of metal}}{\text{weight of chlorine}} \times 35.5$$

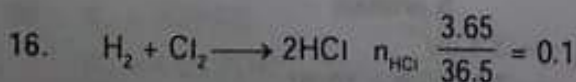
$$= \frac{y}{(x-y)} \times 35.5$$

15. Let the mass be 100 gm

Ratio of moles = Ratio of volumes

$$= \frac{100}{2} : \frac{100}{28} = \frac{100}{16}$$

$$= 56 : 4 : 7$$



2gm 71 gm 73 gm

1mole 1mole 2mole

here 2 mole HCl produced by 1 mole  $\text{H}_2$

1 mole HCl produce by 0.05 mole  $\text{H}_2$

$$n_{\text{H}_2} = n_{\text{Cl}_2} = 0.05$$

$$V_{\text{H}_2} = V_{\text{Cl}_2} = 0.05 \times 22.4 = 1.12 \text{ L}$$

17. Weight of

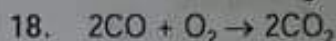
(1) 1g-atom of C = 12 g

(2)  $\frac{1}{2}$  mole  $\text{CH}_4$  = 8g

(3) 10 ml water = 10 gm

(4)  $3.01 \times 10^{23}$  atom of oxygen = 8 gm

hence mass is highest in 1g-atom of C



2L 1L 2L at constant temperature

4L 2L 2L

Hence 4L CO require 2L  $\text{O}_2$

19. Molar wt =  $2 \times \text{V.D.}$  and  $x(12 + 16) = 140$

$$= 2 \times 70 \quad x = \frac{140}{28} = 5$$

$$= 140$$

20. mass of 1L  $\text{CO}_2$  = mass of 12 hydrocarbon

mass of 22.4L  $\text{CO}_2$  = mass of 22.4L hydrocarbon

$$44 \text{ g} = \text{mass of 22.4 C hydrocarbon}$$

mass of 1 mole hydrocarbon = 44 gm

Here  $\text{C}_3\text{H}_8$  has molar mass 44 gm.

21. At same temperature and pressure, same

volume and same moles are contained

Ratio of moles  $^n\text{H}_2 : ^n\text{He} : ^n\text{O}_2 : ^n\text{O}_3$

$$1 : 1 : 1 : 1$$

Ratio of No. of  $\text{H}_2 : \text{He} : \text{O}_2 : \text{O}_3$

$$\text{atoms} \quad 2 : 1 : 2 : 3$$

22. In I<sup>st</sup> oxide

50 gm O combine with 50 gm S

1 gm O combine with 1gm S

In II<sup>nd</sup> oxide

60 gm O combine with 40 gm S

$$1 \text{ gm O combine with } \frac{2}{3} \text{ gm S}$$

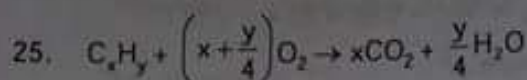
Ratio in which 1 gm O combine with different masses of sulphur 3 : 2

23.

N	$\frac{2.314}{14} = 0.165$	$\frac{0.165}{0.165} = 1$
O	$\frac{5.34}{16} = 0.333$	$\frac{0.333}{0.165} = 2$

$\therefore$  Empirical formula =  $\text{NO}_2$

24.  $\text{CO}_2(\text{g}) + \text{C}(\text{s}) \longrightarrow 2\text{CO}(\text{g})$   
 1 cc of  $\text{CO}_2$  produce 2 cc of CO  
 16 cc of  $\text{CO}_2$  produce 32 cc of CO



$$1\text{ mL} \quad x\text{ mL} \quad \frac{y}{2}\text{ mL}$$

$$500\text{ mL} \quad 500\text{ mL} \quad 250\text{ mL}$$

Hence, and

$$500x = 2000 \quad 250y = 2500\text{ mL}$$

$$x = 4 \quad y = 10\text{ mL}$$

$$\therefore \text{formula} = \text{C}_4\text{H}_{10}$$

26. 1 mol  $\text{Ba}(\text{NO}_3)_2$  contain  $\rightarrow$  3 mole ions

$$n_{\text{Ba}(\text{NO}_3)_2} = \frac{0.1 \times 1}{1000} = 10^{-4}$$

$$\text{No. of ions} = 3 \times 10^{-4} \times 6.02 \times 10^{23} \\ = 3 \times 6.02 \times 10^{19}$$

27. 1 gm equivalent of O = 8 gm

Hence,

$$0.25\text{ mole O}_2 \text{ contain } 8\text{ gm oxygen}$$

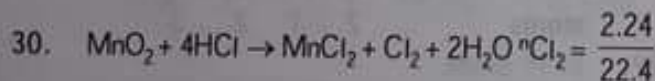
29. 8 mole O contained by  $\rightarrow$  1 mole  $\text{Mg}_3(\text{PO}_4)_2$

$$1\text{ mole O contained } \frac{1}{8}\text{ mole } \text{Mg}_3(\text{PO}_4)_2$$

by

$$0.25\text{ mole O is } \Rightarrow \frac{1}{8} \times 0.25\text{ mole } \text{Mg}_3(\text{PO}_4)_2$$

$$\text{contained by} = 3.125 \times 10^{-2}\text{ mole } \text{Mg}_3(\text{PO}_4)_2$$



$$1\text{ mole} \quad 1\text{ mole}$$

$$87\text{ gm} \quad 1\text{ mole} = 0.1\text{ mole}$$

$$1\text{ mole } \text{Cl}_2 \text{ produced by } 87\text{ gm pure } \text{MnO}_2$$

$$0.1\text{ mole } \text{Cl}_2 \text{ produced by } 8.7\text{ gm pure } \text{MnO}_2$$

$$\% \text{ purity} = \frac{8.7}{10} \times 100 = 87\%$$

$$\% \text{ Impurity} = 13\%$$

### ATOMIC STRUCTURE

42.  $E = nh\nu$

$$= 6.023 \times 10^{23} \times 6.62 \times 10^{-34} \times 909 \times 10^3$$

$$= 3.62 \times 10^{-4}\text{ J}$$

43.  $\lambda = \frac{h}{\sqrt{2mK.E_{\text{cm}}}}$

$$= \frac{6.63 \times 10^{-34}}{\sqrt{2 \times 9.1 \times 10^{-31} \times 1.67 \times 10^{-27}}}$$

$$= \frac{6.62 \times 10^{-34}}{\sqrt{2 \times \frac{R}{N_A} \times 300 \times 1.67 \times 10^{-27}}}$$

$$= 178\text{ pm}$$

44.  $\nu = \frac{C}{\lambda} = \frac{C}{\frac{h}{p}} = \frac{pC}{h} = \frac{2K.E}{h}$  (P is momentum)

45.  $\frac{E_1}{E_2} = \frac{Z_1^2}{Z_2^2} \times \frac{n_2^2}{n_1^2}$

$$\frac{(-19.6 \times 10^{-18})}{E_2} = \frac{2^2}{3^2} \times \frac{1^2}{1^2}$$

$$E_2 = -4.41 \times 10^{-17}\text{ J atom}^{-1}$$

47.  $P.E = 2 T.E \times Z^2$   
 $= 2 \times (-3.4) \times 2^2$   
 $= -27.2\text{ eV}$

48.  $2\pi r = n\lambda$   
 $2\pi(9X) = 3\lambda$   
 $l = 6\pi X$

49.  $mvr = n \frac{h}{2\pi}$

$$= \frac{5h}{2\pi}$$

$$= 2.5 \frac{h}{\pi}$$

50.  $1s^2 2s^2 2p^6 3s^2 3p^6 4s 3d^5$

52.  $\lambda = \frac{h}{mv}$

53.  $\ell = 2 \Rightarrow d$  subshell

5 orbitals

55.  $E_2 = -3.4\text{ eV}$   
 $= -3.4 \times 1.6 \times 10^{-19}\text{ J}$   
 $= -5.44 \times 10^{-19}\text{ J}$

56.  $\Delta X \cdot \Delta V = \frac{h}{4\pi m}$

$$\Delta V = \frac{0.527 \times 10^{-34}}{5 \times 10^{-4} \times 2 \times 10^{-5}}$$

$$= 5.2 \times 10^{-27}$$

59.  $n = 3$

$$\therefore \ell = 0, 1, 2$$

60.  $\frac{\lambda_1}{\lambda_2} = \sqrt{\frac{V_2}{V_1}} = \sqrt{\frac{100}{400}} = \frac{1}{2}$

61. nos of  $e^- = 2 + 8 + 8 + 2 = 20$

$$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$$

$$m = 0, s = +\frac{1}{2} \Rightarrow \text{number of } e^- = 6$$

65. Angular momentum =  $\sqrt{\ell(\ell+1)} \frac{h}{2\pi}$

$$= \sqrt{6} \frac{h}{2\pi}$$

67. Magnetic moment =  $\sqrt{n(n+2)}$  B.M

$$\therefore n = 3$$

hence  $Ti^{+}$

73.  $\lambda = \frac{h}{mv} = \frac{6.62 \times 10^{-34}}{9.1 \times 10^{-31} \times 2.99 \times 10^8}$

$$= 0.024 \text{ \AA}$$

77.  $I.E._{\text{ion}} = I.E._H \times Z^2 = 13.6 \times 4 = 54.4 \text{ eV}$

#### CHEMICAL EQUILIBRIUM



$$4 \quad 0 \quad 0$$

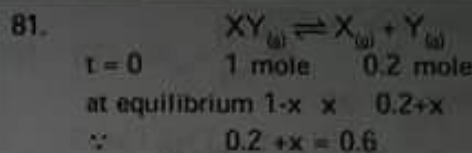
$$4 - 0.8 \quad 0.8 \quad 0.8$$

$$K_c = \frac{0.8 \times 0.8}{3.2} = 0.2$$

80.  $K_c = [Cl]^2 [R] \dots (1)$

$$K_c = 4 [Cl]^2 [R]^1 \dots (2)$$

$$(1), (2) \quad [R]^1 = \frac{1}{4} [R]$$



$$t = 0 \quad 1 \text{ mole} \quad 0.2 \text{ mole}$$

$$\text{at equilibrium } 1-x \quad x \quad 0.2+x$$

$$\therefore 0.2 + x = 0.6$$

$$x = 0.4 \text{ mole}$$

$$K = \frac{0.6 \times 0.4}{0.6} = 0.4$$

83.  $K_c = [X^{+3}] [Y^{-3}] \dots (1)$

$$K_c = [X^{+3}]^1 \left\{ \frac{1}{2} [Y^{-3}] \right\}^2 \dots (2)$$

$$(1) = (2)$$

$$\frac{1}{8} [X^{+3}]^1 = [X^{+3}]$$

$$[X^{+3}]^1 = 8 [X^{+3}]$$

84.  $K_c = \frac{(6)^2}{3 \times 6 \times 9} = \frac{2}{9}$

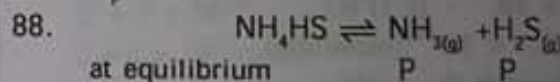
85.  $P_{H_2} = \frac{3}{4} \times 2 = \frac{3}{2} \text{ atm}$

86.  $K_p = K_c (RT)^{\Delta n_g}, \therefore \Delta n_g = 0$

$$K_p = 5$$

87.  $K_p = (7.9 \times 10^{-3}) \times (0.0821 \times 115)^{0.5}$

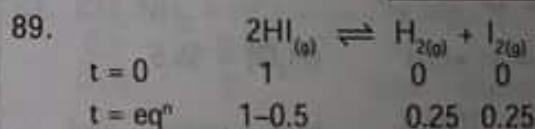
$$K_p = 7.56 \times 10^{-2}$$



at equilibrium

$$P_{\text{Total}} = 2P = 0.66$$

$$P = 0.33 \text{ atm}$$



$$t = 0 \quad 1 \quad 0 \quad 0$$

$$t = \text{eq}^n \quad 1-0.5 \quad 0.25 \quad 0.25$$

$$K_c = \frac{(0.25)^2}{(0.5)^2} = 0.25$$

#### IONIC EQUILIBRIUM

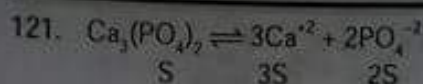
120. One  $OH^-$  molecule means monoacidic base.

Like  $NH_4OH$  or  $BOH$



$$K_b = Ca^2 \Rightarrow Kb$$

$$K_b = 0.05 \times \left( \frac{2.5}{100} \right)^2 \Rightarrow 3.1 \times 10^{-5}$$



100 ml have = w gm

$$100 \text{ ml have} = \frac{w}{100} \times 1000 = \frac{w \times 10}{M} \text{ (solubility)}$$

$$\text{Now } K_{sp} = [\text{Ca}^{+2}]^3 [\text{PO}_4^{-2}]^2$$

$$\Rightarrow \left[ \frac{w \times 10 \times 3}{M} \right]^3 \left[ \frac{w \times 10 \times 2}{M} \right]^2$$

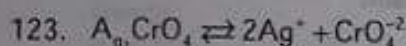
$$\text{Approx} = 10^7 \left( \frac{w}{M} \right)^5$$

$$122. \text{ no of mole of Benzoic acid} = \frac{0.2}{122}$$

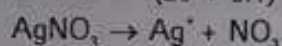
$$\text{eq. of Ba(OH)}_2 = \text{eq. of C}_6\text{H}_5\text{COOH}$$

$$2 \times \frac{0.12 \times V}{1000} \Rightarrow 1 \times \frac{0.2}{122}$$

$$V = 6.83 \text{ ml}$$



$$(25 + 0.1) s'$$

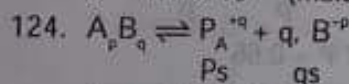


$$0.1 + 25' \quad 0.1$$

$$K_{sp} = [0.1 + 25']^2 [s']$$

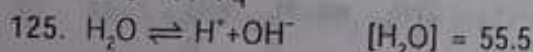
$$1.1 \times 10^{-12} = (0.1)^2 (s')$$

$$s' = 1.1 \times 10^{-10} \text{ (mole/litre)}$$



$$K_{sp} = [P_s]^p [q_s]^q$$

$$\Rightarrow S^{p \cdot a} \cdot P^p \cdot q^q$$



$$K \Rightarrow \frac{[\text{H}^+][\text{OH}^-]}{[\text{H}_2\text{O}]} \quad [\text{H}^+] = [\text{OH}^-] = 10^{-7}$$

at -25°C

$$K = \frac{10^{-7} \times 10^{-7}}{55.5}$$

$$K = 1.8 \times 10^{-16}$$

$$126. K = \frac{K_s}{K_w} = 10^{10}$$

$$128. \text{ meq of HCl} = 0.5 \times 25 = 12.5$$

$$\text{ meq of NaOH} = 0.5 \times 10 = 5$$

remaining of HCl in mixture = 7.5

$$\text{Total volume} = 25 + 10 + 15 = 50 \text{ mL}$$

$$[\text{H}^+] = \frac{7.5}{50}$$

$$\text{pH} = \log \frac{7.5}{50} = 0.82$$

$$129. \text{pOH} = \log[\text{OH}^-], \text{ then } \text{pH} = 14 - \text{pOH}$$

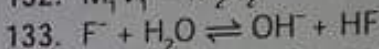
$$130. (\text{OH}^-) \frac{0.01}{10} = 10^{-3} \Rightarrow \text{pOH} \Rightarrow \text{pH} = 14 - 3 = 11$$

$$\text{change in pH} = 11 - 7 = 4$$

$$131. K_a = C\alpha^2 \quad 0.1 \times (1.32 \times 10^{-2})^2 = 1.74 \times 10^{-5}$$

$$\text{pKa} = 5 - \log 1.74 = 5 - 0.26 = 4.74$$

$$132. M_1 V_1 = M_2 V_2$$



$$0.01(1-h) \quad 0.01h \quad 0.01h$$

$$135. \text{acidic strength} \propto K_a$$

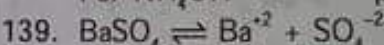
$$136. K_b > K_a$$

$$137. K_{sp} = 45^3 = 4 \times 10^{-9} \Rightarrow 5 = 10^{-3}$$

$$138. K_a = K_b = 10^{-5}$$

For  $\text{NH}_4\text{OH}$

$$\text{pOH} = 3 \text{ then } \text{pH} = 11$$



$$10^{-4} \quad x$$

$$K_{sp} = [10^{-4}][x]$$

$$4 \times 10^{-10} = 10^{-4} \times x \Rightarrow x = 4 \times 10^{-6}$$

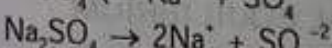
$$140. S = \frac{\text{mol}}{\text{Litre}}$$

Now in gm/litre =  $5 \times m \cdot \text{wt}$

$$K_{sp} = 1.56 \times 10^{-10}$$

$$s = 1.25 \times 10^{-5} \text{ mol/L}$$

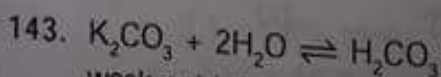
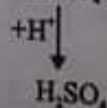
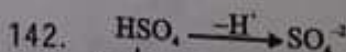
$$s = 143.5 \times 1.25 \times 10^{-5} \text{ gm/L}$$



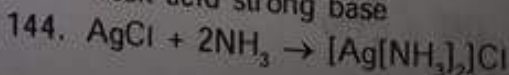
$$0.20 \quad 0.10 + 5$$

$$K_{sp} = [5'] [5' + 0.10]$$

$$s' = 4 \times 10^{-10}$$



weak acid strong base

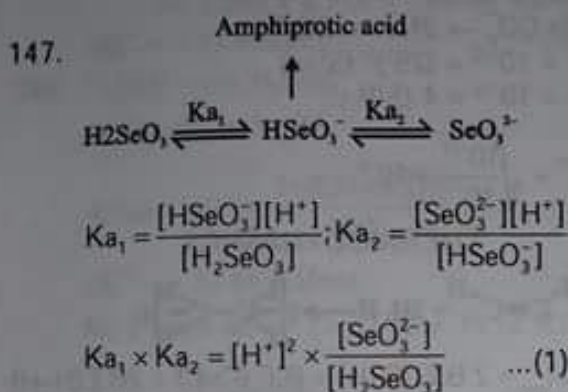


145. total  $[H^+] = 10^{-6} + 10^{-7}$   
 $= 10^{-7} [10 + 1]$   
 $[H^+] = 11 \times 10^{-7}$

$pH = -\log (11 \times 10^{-7})$

$pH = 5.98$

146.  $\propto \sqrt{v}$



At isoelectric point,  $[SeO_3^{2-}] \approx [H_2SeO_3]$

then from (1)

$K_{a1} \times K_{a2} = [H^+]^2$

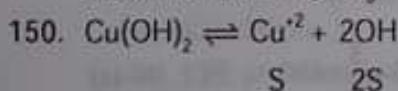
$\Rightarrow [H^+] = (K_{a1} \times K_{a2})^{1/2}$

$\therefore pH = \log (K_{a1} \times K_{a2})^{1/2}$

$\Rightarrow pH = \frac{1}{2} (pK_{a1} + pK_{a2})$

148. due to odd ion effect

149. Due to higher conc of NaCl reaction goes more backward than  $AgNO_3$



$K_{sp} = 4S^3$

Now  $\begin{cases} 2S = [OH^-] \\ pOH = \log [OH^-] \end{cases}$

$4S^3 = 32 \times 10^{-21}$

$S^3 = 8 \times 10^{-21}$

$S = 2 \times 10^{-7}$

$[OH^-] = 2S = 4 \times 10^{-7}$

$pOH = 7 - \log 4$

$pOH = 7 - 0.6 = 6.4$

$pH = 14 - 6.4 = 7.6$

151.  $[H^+] = K_{in} \times \frac{[HIn]}{[In^-]}$

Case I  $[H^+]_1 = 3 \times 10^{-5} \times \frac{0.75}{0.25} = 9 \times 10^{-5}$

Case II  $[H^+]_2 = 3 \times 10^{-5} \times \frac{0.25}{0.75} = 1 \times 10^{-5}$

Change in  $[H^+] = 8 \times 10^{-5}$

152.  $pH = pK_a \pm 1$

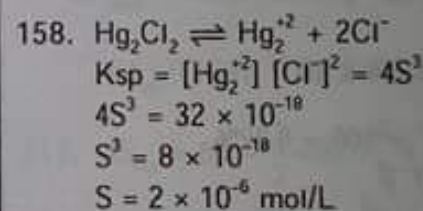
154. Excess of acid entering the blood stream will react with  $HCO_3^-$  to produce  $H_2CO_3$  and this newly produced  $H_2CO_3$  will not further dissociate due to common ion effect.

155.  $pK_a = -\log K_a$  &  $pK_b = -\log K_b$

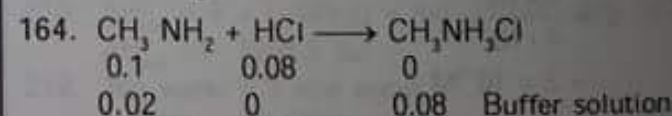
$\uparrow pK_a \quad K_a \downarrow$  (Acidic strength)

157. meq. of HCl =  $0.050 \times 20 = 1$   
 meq. of  $Ba(OH)_2 = 0.10 \times 2 \times 30 = 6$   
 meq of  $Ba(OH)_2$  Left =  $6 - 1 = 5$   
 total volume =  $20 + 30 = 50$  ml

$[OH^-] = \frac{5}{50} = 0.1$



161.  $K_n = \frac{K_w}{K_b} = \frac{10^{-14}}{10^{-5}} = 10^{-9}$



$pOH = pK_b + \log \left[ \frac{\text{salt}}{\text{Base}} \right]$

$K_b = 5 \times 10^{-4}$

$pK_b = 4 - \log 5$

$= 4 - 0.7$

$= 3.3$

$= 3.3 + \log \frac{0.08}{0.02}$

$= 3.3 + \log 4$

$= 3.3 + 0.6$

$= 3.9$

$pH = 14 - 3.9 = 10.1$

$[H^+] = \text{Antilog } (-10.1)$

$= 8 \times 10^{-11}$  mol/L

166. pH of acidic buffer solution is

$$\text{pH} = \text{pK}_a + \log \frac{\{\text{salt}\}}{\{\text{Acid}\}}$$

$$\text{K}_a = 1.8 \times 10^{-5}$$

$$\text{pK}_a = 5 - \log 1.8$$

$$= 5 - 0.25$$

$$= 4.75$$

$$\text{pH} = 4.75 + \log \frac{0.15}{0.1}$$

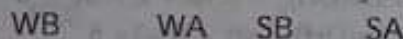
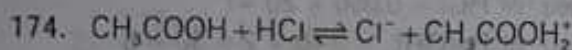
$$= 4.75 + \log 1.5$$

$$= 4.75 + 0.15$$

$$= 4.90$$

173.  $\text{pH} = 7 + \frac{1}{2}\text{pK}_a + \frac{1}{2}\log C$

$$= 7 + 3 - \frac{1}{2} = 9.5$$



175.  $\text{pK}_b = 4.7$

$$\text{K}_b = 10^{-5} \times 10^{0.3}$$

$$\text{K}_b = 2 \times 10^{-5} = C\alpha^2$$

$$2 \times 10^{-5} = 5 \times 10^{-3} \alpha^2$$

$$\alpha^2 = \frac{2 \times 10^{-5}}{5 \times 10^{-3}} = 0.4 \times 10^{-2}$$

$$\alpha = 6.32 \times 10^{-2} \times 100 = 6.32\%$$

177.  $\text{K}_{sp} = [\text{Mg}^{2+}][\text{F}^-]^2$

$$\text{K}_{sp} = (5')(25' + c)^2$$

$$8 \times 10^{-8} = 5' c^2$$

$$s' = \frac{8 \times 10^{-8}}{4 \times 10^{-2}}$$

$$= 2 \times 10^{-6} \text{ M}$$

178.  $\text{pH} = 7 + \frac{1}{2}\text{pK}_a - \frac{1}{2}\text{pK}_b$

$$\text{pH} = 7$$

179.  $\text{K}_{sp} = [\text{Mg}^{2+}][\text{OH}^-]^2$

$$10^{-12} = [10^{-2}][\text{OH}^-]^2$$

$$[\text{OH}^-]^2 = 10^{-10}$$

$$[\text{OH}^-] = 10^{-5}$$

$$\text{pOH} = 5$$

$$\text{So pH} = 14 - 5 = 9$$

180.  $[\text{H}_3\text{O}^+] = \sqrt{\text{K}_a C}$

$$= \sqrt{4 \times 10^{-8} \times 0.25}$$

$$= 10^{-4}$$

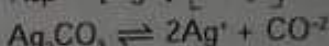
181.  $S = \frac{0.46}{245} = 187 \times 10^{-3} \text{ M}$

$$\text{K}_{sp} = 4S^3$$

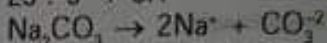
$$= 4 \times (187 \times 10^{-3})^3$$

$$\text{K}_{sp} = 2.6 \times 10^{-8}$$

182.  $\text{K}_{sp} = [\text{Ag}^+]^2[\text{CO}_3^{2-}]$



$$25', 5' + 0.1$$

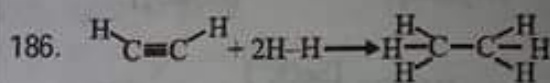


$$4 \times 10^{-13} = (2S')^2 (S' + c)$$

$$4 \times 10^{-13} = 4 (S')^2 c$$

$$S' = \sqrt{\frac{10^{-13}}{10^{-1}}} = 10^{-6}$$

### THERMODYNAMICS



$$\Delta H_{\text{rxn}} = 2 \text{ B.E. (C-H)} + \text{B.E. (C}\equiv\text{C)} + 2 \text{ B.E. (H-H)}$$

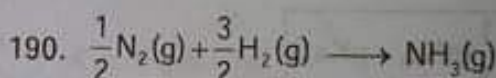
$$- 6 \text{ B.E. (C-H)} - \text{B.E. (C-C)}$$

$$\Rightarrow \text{B.E. (C}\equiv\text{C)} + 2 \text{ B.E. (H-H)} - 4 \text{ B.E. (C-H)} - \text{B.E. (C-C)}$$

$$\Rightarrow 601 + 2 \times 240 - 4 \times 425 - 340$$

$$\Delta H_{\text{rxn}} = -599 \text{ KJ/mol}$$

189.  $\Delta n_g$  should be greater than 0



$$\Delta H_{\text{rxn}} = \Delta_f H(\text{NH}_3) = \frac{1}{2} \text{ B.E. (N}\equiv\text{N)} + \frac{3}{2} \text{ B.E. (H-H)}$$

$$- 3 \text{ B.E. (N-H)}$$

$$- 120 = \frac{1}{2} \times 240 + \frac{3}{2} \times 400 - 3 \text{ B.E. (N-H)}$$

$$\text{B.E. (N-H)} = 280 \text{ KJ/mol.}$$



$$\Delta_f H(\text{CH}_4) = (2) + 2 \times (3) - (1)$$

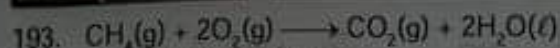
$$= -y + 2(-2) - (-x)$$

$$\Rightarrow x - y - 2z$$

192.  $(3) = -\frac{1}{2} \times (1) - \frac{1}{2} \times (2)$

$$= -\frac{1}{2} \times (-27.1) - \frac{1}{2} \times (-53.5)$$

$$\Delta H. = + 40.3 \text{ KJ}$$



$$\Delta H^\circ = \Delta U^\circ + \Delta n_g RT$$

$$\Delta H^\circ = -x + (-2) R \times 298$$

$$\Delta H^\circ = -x - 596 R$$

194. In the given reaction heat will release in bond formation and randomness decreases.

195.  $\Delta G^\circ = -2.303 RT \log K_{eq}$

$$= -2.303 \times 8.314 \times 300 \log 100 \text{ J}$$

$$\Delta G^\circ = -11.488 \text{ KJ}$$



$$\Delta H^\circ = \Delta E^\circ + \Delta n_g RT$$

$$40.66 = \Delta E^\circ + \frac{1 \times 8.314 \times 373}{1000}$$

$$\Delta E^\circ = +37.56 \text{ KJ/mol}$$

$$\text{for 2 mole } \Delta E^\circ = 2 \times 37.56 = 75.12 \text{ KJ}$$

199.  $\Delta H = 2 + \frac{1 \times 2 \times 300}{1000} = 2.6 \text{ KCal}$

$$\Delta G = \Delta H - T\Delta S$$

$$2.6 - \frac{300 \times 50}{1000} = -12.4 \text{ KCal.}$$

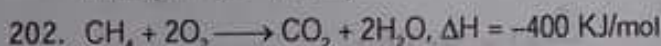
200. (4) = (1) + (2) - (3)

$$\Delta H = 150 + (-125) - 350$$

$$= -325 \text{ KJ}$$

201.  $\Delta H_{\text{rxn}} = -900 = -6 \text{ BE. (N-H)}$

$$\text{B.E. (N-H)} = 150 \text{ KJ}$$



$\therefore$  for 2 mole or 36 gm water, heat released = -400 KJ/mol

$\therefore$  for 400 gm water, heat released will be

$$= \frac{-400}{36} \times 40$$

$$= -444.44 \text{ KJ}$$

206.  $W = -2.303 nRT \log \frac{V_2}{V_1}$

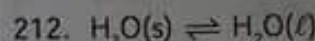
$$= -\frac{2.303 \times 2 \times 8.314 \times 300 \log \frac{40}{4}}{1000} \text{ KJ}$$

$$W = -11.224 \text{ KJ}$$

207.  $W = -P(V_2 - V_1) = -PnRT \left( \frac{1}{P_2} - \frac{1}{P_1} \right)$

$$W = -\frac{1 \times 5 \times 8.314 \times 300 \left( \frac{1}{1} - \frac{1}{10} \right)}{1000} \text{ KJ}$$

$$W = -11.224 \text{ KJ}$$



$$\Delta G = \Delta H - T\Delta S$$

$$0 = \Delta H - \frac{273 \times 5.26}{1000}$$

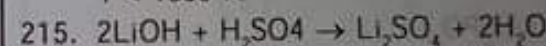
$$\Delta H = 1.435 \text{ KCal/mol}$$

214.  $\Delta G = \Delta H - T\Delta S < 0$  for spontaneous process

$$T > \frac{\Delta H}{\Delta S}$$

$$T < \frac{-100 \times 10^3}{-100}$$

$$T < 1000 \text{ K}$$



$$\Delta H_{\text{neut}} = -69.6 \text{ KJ/mol} = 2\Delta H_{\text{ion}}(\text{LiOH}) + 0 - 57.3 \times 2$$

$$\Delta H_{\text{ion}}(\text{LiOH}) = 22.5 \text{ KJ/mol.}$$

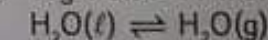
217.  $\Delta S_{\text{rxn}} = 50 - \frac{1}{2} \times 60 - \frac{3}{2} \times 40 = -40 \text{ JK}^{-1}\text{mol}^{-1}$

$$T = \frac{\Delta H}{\Delta S} = \frac{-30 \times 10^3}{-40} \Rightarrow 750 \text{ K}$$

218.  $\Delta H_{\text{rxn}} = 4 \times (-393.5) - 4 \times (-110.5) - 2 \times (-33.2)$

$$\Delta H_{\text{rxn}} = -1065.5 \text{ KJ}$$

219. 18g water = 1 mol water



$$\Delta H = \Delta E + \Delta n_g RT$$

$$40.66 = \Delta E + \frac{1 \times 8.314 \times 373}{1000}$$

$$\Delta E = 40.66 - 3.1$$

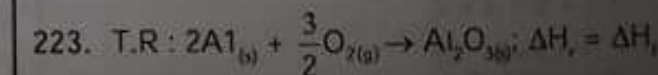
$$\Delta E = +37.56 \text{ KJ}$$

220. (1) + 2 \times (2) - (3)

$$\Delta H_f(\text{CH}_4) = \Delta H_1 + 2\Delta H_2 - \Delta H_3$$

$$= -94.2 + 2 \times (-68.3) - (-210.8)$$

$$= -20 \text{ KCal}$$



$$\Delta H_1 = \frac{3352}{2} = 1676 \text{ KJ/mol}$$

$$224. \Delta G = \Delta H - T\Delta S$$

$$= (+ve) - (+ve)$$

$$\Delta G = (+ve) - (-ve)$$

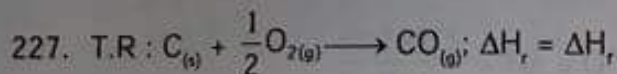
$$\Delta G = -ve \text{ only at high temp.}$$

$$226. \Delta G^\circ = -nFE^\circ$$

$$-21.20 = -1 \times 96500 \times E^\circ$$

$$E^\circ = \frac{21.20 \times 1000}{96500}$$

$$= 0.22V$$



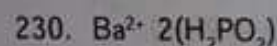
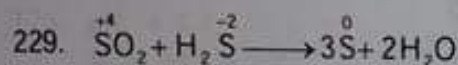
$$\text{T.R.} = (I) + (II) \text{ rev}$$

$$= (-X) + (+Y)$$

$$\Delta H_f = Y - X$$

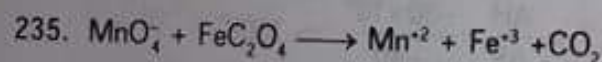
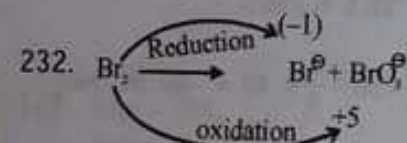
$$228. \text{average B.E} = \frac{368}{2} = 184 \text{ kJ/mol}^{-1}$$

REDOX



$$2+x-4 = -1$$

$$x = +1$$



$$\text{Equivalents of } MnO_4^- = \text{Equivalents of } FeC_2O_4$$

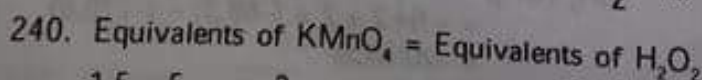
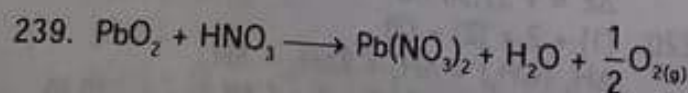
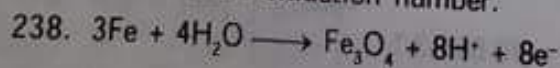
$$x \times 5 = 2 \times 3$$

$$x = 1.2 \text{ mol}$$

$$236. 2 \times 2 + 2x - 14 = 0$$

$$x = +5$$

237. Intermediate oxidation number.



$$1.5 \times 5 = x \times 2$$

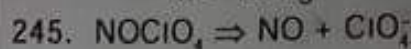
$$x = \frac{1.5 \times 5}{2} = \frac{15}{4}$$



$$\text{Equivalents of } I_2 = \text{Equivalents of } HNO_3$$

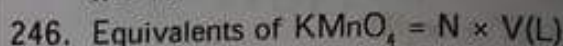
$$\frac{5}{254} \times 10 = \frac{x}{63} \times 1$$

$$x = 12.4 \text{ g}$$



$$x - 8 = -1$$

$$x = +7$$

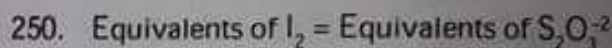


$$= 0.05 \times 4 = 0.2$$

$$\text{No. of equivalents} = \text{moles} \times n \text{ factor}$$

$$\text{moles} = \frac{0.2}{5}$$

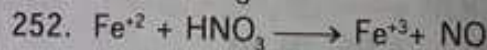
$$\text{weight} = \frac{0.2}{5} \times 158 = 6.32 \text{ g}$$



$$\frac{x}{254} \times 2 = N \times V(L)$$

$$\frac{x}{127} = \frac{4}{1000} \times 0.11$$

$$x = 0.558 \text{ g}$$



$$\text{Equivalents of } Fe^{+2} = \text{Equivalents of } HNO_3$$

$$\frac{8}{56} \times 1 = N \times V(L)$$

$$\frac{8}{56} = (3 \times 3) \times \frac{V(ml)}{1000}$$

$$V(ml) = \frac{8}{9 \times 56} \times 1000 = 15.87 \text{ ml}$$

BEHAVIOUR OF GASES

$$257. P_1V_1 = P_2V_2$$

$$V_2 = \frac{1 \times 2.27}{0.2} = 11.35$$

$$\text{so } V < 11.35$$

$$258. \frac{V_2}{T_2} = \frac{V_1}{T_1}$$

$$V_2 = \frac{2 \times 299.21}{296.4} = 2.01 \text{ L}$$

$$259. \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$P_2 = \frac{500 \times 400 \times 280}{300 \times 550}$$

$$260. P_{H_2} = \frac{n_{H_2}}{n_{H_2} + n_{CH_4}}$$

$$P_{H_2} = \frac{\frac{5}{2}}{\frac{5}{2} + \frac{10}{16}} \times 30$$

$$270. r_{SO_2} = \sqrt{2} r_s$$

$$\frac{r_{SO_2}}{r_s} = \sqrt{2} = \sqrt{\frac{M_{w_{SO_2}}}{M_{w_s}}} = \sqrt{\frac{M_{w_{SO_2}}}{64}}$$

$$M_{w_{SO_2}} = 2 \times 64 = 128$$

$$V.D = \frac{M_w}{2} = \frac{128}{2} = 64$$

$$271. \frac{r_A}{r_B} = \frac{1}{2} = \sqrt{\frac{M_{w_B}}{M_{w_A}}}$$

$$\frac{M_{w_A}}{M_{w_B}} = \frac{4}{1}$$

$$272. \frac{r_A}{r_B} = \frac{4}{1} = \sqrt{\frac{d_B}{d_A}}$$

$$\frac{d_A}{d_B} = \frac{1}{16}$$

### SOLID STATE

$$279. d = \frac{Z \times M}{a^3 \times N_A}$$

$$10.3 = \frac{2 \times 96}{a^3 \times 6 \times 10^{23}}$$

$$a = 3.14 \times 10^{-8} \text{ cm} = 314 \text{ pm}$$

$$r = \frac{\sqrt{3}a}{4} = 135.96 \text{ pm}$$

$$281. A \rightarrow \text{corners} = 8 \times \frac{1}{8} = 1$$

$$B \rightarrow \text{at 5 face centers} = 5 \times \frac{1}{2} = \frac{5}{2}$$

$$A : B = 1 : \frac{5}{2} = 2 : 5$$



$$284. \frac{r_{A^{+1}}}{r_{B^{+2}}} = \frac{94}{146} = 0.64$$

The radius ratio lies in between 0.414 to 0.732  
so, cation should be in octahedral void  
therefore, structure will be Rock salt.

$$285. O^{2-} \rightarrow \text{ccp} \rightarrow 4$$

$$A \rightarrow \left(\frac{1}{8}\right)^m \text{ T.V.} = \frac{1}{8} \times 8 = 1$$

$$B \rightarrow \left(\frac{1}{4}\right)^n \text{ O.V.} = \frac{1}{4} \times 4 = 1$$



287.  $Cl^-$  is present at corners while  $Cs^+$  is present at  
Body centre, so minimum interatomic distance

$$= \frac{\sqrt{3}a}{2} = 3.72 \text{ pm}$$

$$288. d = \frac{Z \times M}{a^3 \times N} \quad \begin{array}{l} M \rightarrow \text{mass of substance} \\ N \rightarrow \text{No of atoms} \end{array}$$

$$N = \frac{2 \times 208}{(288 \times 10^{-10})^3 \times 7.2} = 24 \times 10^{23}$$

$$289. M \rightarrow \frac{1}{3} \text{ of T.V.} = \frac{1}{3} \times 8 = \frac{8}{3}$$

$$N \rightarrow \text{ccp} \rightarrow 4$$

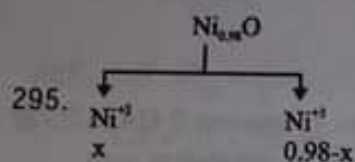
$$\frac{8}{3} : 4$$

$$2 : 3 \Rightarrow M_2 N_3$$

$$290. d = \frac{Z \times M}{a^3 \times N_A}$$

$$M = \frac{d \times a^3 \times N_A}{Z} = \frac{8.92 \times (3.6 \times 10^{-8})^3 \times 6 \times 10^{23}}{4} = 63$$

$$294. \text{ For ccp Lattice } a = \frac{4r}{\sqrt{2}} = \frac{4 \times 215}{\sqrt{2}} = 608.2 \text{ pm}$$



charge Balancing

$$x \times 2 + (0.98 - x) \times 3 = 2$$

$$2x + 2.94 - 3x = 2$$

$$-x = -0.94$$

$$x = 0.94$$

$$\text{fraction of } \text{Ni}^{+2} = \frac{0.94}{0.98} = 0.959$$

$$298. \text{ CsCl} \rightarrow \text{cation in cubic void}$$

$$\frac{r^+}{r^-} = 0.732$$

$$r = \frac{120}{0.732} = 164 \text{ pm}$$

$$304. \text{ When AgCl is doped with CdCl}_2$$

No. of  $\text{Cd}^{+2}$  added = No. of cation vacancies.

$$306. \text{ A} \rightarrow \text{HCP} \rightarrow 6$$

$$\text{C} \rightarrow \left(\frac{2}{3}\right) \text{O.V.} \rightarrow \frac{2}{3} \times 6 = 4$$

C	A
4	6

$$2:3$$



$$307. \text{ no. of atoms in FCC} = 4$$

$$\text{volume of 1 atom} = \frac{4}{3}\pi r^3$$

$$\text{Total volume of 4 atoms} = 4 \times \frac{4}{3}\pi r^3$$

$$= \frac{16}{3}\pi r^3$$

$$308. r_{\text{Na}^+} + r_{\text{Cl}^-} = \frac{a}{2}$$

$$281 \text{ pm} = \frac{a}{2}$$

$$562 \text{ pm} = a$$

$$309. \text{ O}^{2-} \text{ forms ccp} \rightarrow 4$$

$$\text{A occupy } \frac{1}{6} \text{th of THV} \rightarrow \frac{1}{6} \times 8 = \frac{4}{3}$$

$$\text{B occupy } \frac{1}{3} \text{rd of OHV} \Rightarrow \frac{1}{3} \times 4 = \frac{4}{3}$$

$$\text{Formula, } \text{A}_{\frac{4}{3}}\text{B}_{\frac{4}{3}}\text{O}_4 \Rightarrow \text{ABO}_3$$

$$310. \text{ A occupy } \frac{3}{4} \text{ of THV} \Rightarrow \frac{3}{4} \times 8 = 6$$

$$\text{B forms ccp} \Rightarrow 4$$

$$\text{Formula, } \text{A}_6\text{B}_4$$

$$\Rightarrow \text{A}_3\text{B}_2$$

$$311. \text{ In fcc unit cell, } (a = 361 \text{ pm})$$

$$4r = \sqrt{3} a$$

$$r = \frac{\sqrt{3}}{4} a$$

$$= \frac{\sqrt{3}}{4} \times 361$$

$$r = 127 \text{ pm}$$

$$313. d = \frac{Z \times M_w}{a^3 \times N_A}$$

$$10 = \frac{4 \times M_w}{(10^{-8})^3 \times 6 \times 10^{23}}$$

$$6 = 4 \times M_w$$

$$\frac{6}{4} = M_w \Rightarrow 1.5 \text{ g}$$

$$\text{mol} = \frac{\text{Mass}}{M_w}$$

$$= \frac{100}{105}$$

$$\text{no. of atoms}$$

$$= \text{mol} \times N_A$$

$$= \frac{100}{1.5} \times 6 \times 10^{23} = \frac{6}{1.5} \times 10^{25} = 4 \times 10^{25}$$

314. A occupies corner  $\Rightarrow 8 \times \frac{1}{8}$

B = occupies face centres  $\rightarrow 6 \times \frac{1}{2} = 3$

$\Rightarrow$  now, atoms along one body diagonal are removed

A  $\rightarrow 6 \times \frac{1}{8} = \frac{3}{4}$

Formula



$\Rightarrow AB$

315. X forms fcc  $\rightarrow 4$

Y occupies THV  $\rightarrow 8$

Z occupies  $\frac{1}{2}$  OHV  $\rightarrow \frac{1}{2} \times 4$

Formula,  $X_4Y_8Z_2$

$\Rightarrow X_2Y_4Z$

316. 4 atoms  $\rightarrow$  1 unit cell

1 atoms  $\rightarrow \frac{1}{4}$  unit cell

$0.1 N_A$  atom  $\rightarrow \frac{0.1}{4} N_A$  unit cell

$\rightarrow 0.025 N_A$  unit cell

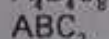
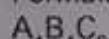
317. In rock salt

A  $\rightarrow$  4 FCC

B  $\rightarrow$  4 OHV

C  $\rightarrow$  8 THV

Formula,



### SOLUTION

318. 30g ethylene glycol ( $HO-CH_2-CH_2-OH$ ) is in 100 mL solution.

$\therefore$  moles of  $C_2H_6O_2 = \frac{30}{62} = 0.484$

and moles of  $H_2O = \frac{70}{18} = 3.89$

$X_{C_2H_6O_2} = \frac{0.484}{0.484 + 3.89} = \frac{0.484}{4.374} = 0.11$

319. Amount of urea  $= \frac{15}{100} \times 500 + \frac{25}{100} \times 400$   
 $= 75 + 100 = 175$  g

% w/w  $= \frac{175}{900} \times 100 = 19.4\%$

320. moles of acid  $= \frac{3.7}{74} = 0.05$

molality of solution  $= \frac{w}{m} \times \frac{1000}{w_{(H_2O)}} = \frac{0.05}{80} \times 1000$   
 $= 0.625m$

321. Molality  $= \frac{w}{n} \times \frac{1000}{w_{(H_2O)}}$

$= \frac{3.5}{58.5} \times \frac{1000}{96.5} = 0.62m$

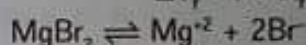
[ $\therefore$  3.5% NaCl solution = 3.5 g NaCl in 96.5g  $H_2O$ ]

322.  $\frac{10}{180} \times 10 = \frac{4}{m_w} \times 10 \Rightarrow m_w = 4 \times 18 = 72$

323.  $P_s = X_A P_A^* + (1 - X_A) P_B^*$

324.  $\Delta T_f = i \times \frac{1000 K_f w}{mW}$

$\Delta T_f = i \times K_f \times \text{molality}$



$i = 1 - \alpha + 3\alpha$

$= 1 - 0.4 + 3 \times 0.4 = 1.8$

$\therefore \Delta T_f = 1.8 \times 1.86 \times 0.2$   
 $= 0.67$

and  $T_1 = T_f - \Delta T_f = -0.67^\circ C$

325. volume of solution  $= \frac{\text{Mass}}{\text{density}} = \frac{100}{1.052}$   
 $= 95.05 \text{ mL}$

Molarity  $= \frac{12.25}{98} \times \frac{1000}{95.05} = 1.315M$

327.  $i = \frac{(\Delta T_f)_{\text{obs}}}{(\Delta T_f)_{\text{theo}}} = \frac{(\Delta T_f)_{\text{obs}}}{K_f \times \text{molality}}$

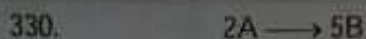
$i = \frac{0.558}{1.86 \times 0.1} = 3$



$i = 1 - \alpha + n\alpha$

$\therefore 3 = 1 + \alpha(n-1)$

$\alpha = \frac{3-1}{2-1} = 1$  or 100%



initially 2 0

in solution  $2-2\alpha$   $5\alpha$

$$i = \frac{2-2\alpha+5\alpha}{2} = \frac{2-0.6+1.5}{2} = 1.45$$

331.  $\pi_1 = \pi_2$

$$\therefore i_1 c_1 = i_2 c_2$$

$$1 \times \frac{6}{60} \times 10 = 2 \times \frac{w}{58.5} \times 10$$

$$\therefore W = \frac{58.5}{20} = 2.925g$$

332.  $P_s = X_A P_A^* + X_B P_B^*$

$$P_s = X_A P_A^* + (1 - X_A) P_B^*$$

$$\therefore 580 = X_A \times 440 + (1 - X_A) 720$$

$$140 = 280 X_A \text{ and } X_A = 0.5$$

$$Y_A = \frac{P_A}{P_s} = \frac{0.5 \times 440}{580} = 0.38$$

340.  $\Delta T_b = \frac{1000 K_b w}{mW}$

$$\text{and } m = \frac{1000 K_b w}{\Delta T_b W}$$

342.  $\pi = CRT = \frac{w}{mV} RT$



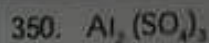
$$\alpha = \frac{i-1}{n-1} = \frac{1.92-1}{3-1} = \frac{0.92}{2} = 0.46 = 46\%$$

348. mole fraction of vinyl chloride =  $\frac{n_{vc}}{n_{vc} + n_{H_2O}}$

$$= \frac{0.09}{55.59} = 0.00162$$

$$X_{(vc)} = \frac{P}{K_H}$$

$$\therefore K_H = \frac{P}{X_{(vc)}} = \frac{1}{0.00162} = 617.284 \text{ bar}$$



$$i = 5 \therefore \alpha = \frac{i-1}{n-1}$$

$$0.9 = \frac{\alpha-1}{5-1}$$

$$\alpha = 3.6 + 1 = 4.6$$

$$\pi = i CRT$$

$$= 4.6 \times \left( \frac{0.03}{6} M \right) R (298)$$

$$= 0.566 \text{ atm}$$

351.  $\Delta T_f = 9.3$

$$\frac{40}{62} \times \frac{1000}{(400-x)} \times 1.86 = 9.3$$

$$\frac{40 \times 1000}{62 \times 9.3} \times 1.86 = 400 - x$$

$$x = 400 - 129.03$$

$$x = 270.97$$

352.  $i \times c$  min then vapour pressure max.

353.  $\pi = CRT = \frac{w}{Mw} \times \frac{1000}{v(mL)} \times R \times T$

$$2.55 = \frac{4.34}{Mw} \times \frac{1000}{1000} \times 0.082 \times 298$$

$$M_w = 41.64$$

354.  $i$  c values

$$Li_2 SO_4 = 3 \times 0.5 = 1.5$$

$$KCl = 2 \times 1 = 2$$

$$BaCl_2 = 3 \times 0.5 = 1.5$$

$$Al_2(SO_4)_3 = 5 \times 1 = 5$$

Max  $i$  c is for  $Al_2(SO_4)_3$

355.  $\Delta T_f = mK_f = \frac{w}{Mw} \times \frac{1000}{W_A} \times K_f$

$$Mw = \frac{1}{0.4} \times \frac{1000}{50} \times 5.12 = 256$$

356.  $P_s = P_B^* + x_1 (P_B^* - P_B^0) = 160 + \frac{1}{2} (60 - 160) = 160 - 50 = 110.$

$$357. m = \frac{1000M}{1000d - MMw}$$

$$\frac{120}{60} \times \frac{1000}{1000} = \frac{1000M}{1000 \times 1.5 - M(60)}$$

$$2.30 \times 1000 - 120M = 1000M$$

$$M = \frac{2.30 \times 1000}{1120} = 2.05$$

$$359. \Delta T_f = 1.22^\circ \text{C}$$

$$\frac{w}{Mw} \times \frac{1000}{W_A} \times K_f = 1.22$$

$$\frac{10}{Mw} \times \frac{1000}{100} \times 1.86 = 1.22$$

$$Mw = \frac{186}{1.22} = 152.4$$

$$360. n_{\text{Ben}} = 20\% = 0.2$$

$$n_{\text{Tot}} = 80\% = 0.8$$

$$P_s = X_B P_B^* + X_T P_T^*$$

$$P_s = 0.2 \times 75 + 0.8 \times 22$$

$$= 15.0 + 17.6$$

$$= 32.6$$

$$361. X_B = \frac{P^o - P_s}{P^o} = \frac{0.8 - 0.6}{0.8} = \frac{1}{4} = 0.25$$

$$362. N = \frac{20}{5.6} = 3.56$$

$$363. \text{ic is max. for } \text{Al}_2(\text{SO}_4)_3$$

$$364. \Delta T_f = 4 \times \frac{0.1}{329} \times \frac{1000}{100} \times 1.86 = 2.26 \times 10^{-2}$$

$$K_f[\text{Fe}(\text{CN})_6] \therefore i = 4$$

$$365. i = 2.74$$

$$\alpha = \frac{i-1}{n-1} = \frac{2.74-1}{3-1} = \frac{1.74}{2} = 0.87$$

$$= 87\%$$

$$366. \frac{1.05}{Mw} \times 10 = \frac{3}{180} \times 10$$

$$Mw = 1.05 \times 60 = 63$$

$$367. \frac{P^o - P_s}{P_s} = \frac{n_B}{n_A} = \frac{W_B / Mw_B}{W_A / Mw_A}$$

$$\frac{1020 - 990}{990} = \frac{5/x}{58.5/18} = \frac{5 \times 78}{58.5x}$$

$$\frac{30}{990} = \frac{5 \times 78}{58.5x} \Rightarrow x = 220$$

$$368. \text{ic is max for } \text{Al}_2(\text{SO}_4)_3$$

$$\therefore \text{min f.P. is for option (4)}$$

$$369. \text{order of } \pi_1 > \pi_2 > \pi_3 > \pi_4$$

$$\therefore \text{order of osmotic pressure is also}$$

$$\pi_1 > \pi_2 > \pi_3 > \pi_4$$

### CHEMICAL KINETICS

$$371. \frac{t_{0.75}}{t_{0.50}} = \frac{\frac{2.3}{k} \log \left( \frac{A_0}{0.25A_0} \right)}{\frac{2.3}{k} \log \left( \frac{A_0}{0.5A_0} \right)} = \frac{\log(4)}{\log 2} = \frac{2}{1}$$

$$372. K = A e^{-\frac{E_a}{RT}}$$

$$\ln K = \ln A - \frac{E_a}{RT}$$

$$373. K_2 = K_1 (m)^{\Delta T/10} = K_1 (2)^{90/10} = K_1 \times (2)^9 = 512K_1$$

$$375. A_0 - A = Kt$$

$$A_0 - 0.5 = 3 \times 10^{-2} \times 25$$

$$A_0 - 0.5 + 0.75 = 1.25M$$

$$376. \ln K = \ln A - \frac{E_a}{RT}$$

$$\ln K = \ln A - \frac{E_a}{R} \left( \frac{1}{T} \right) \text{ slope} = \frac{-E_a}{R}$$

$$377. \begin{array}{ccc|c} A & \longrightarrow & 2B + C & \\ P_i & 0 & 0 & P_i -x+2x+x=P_i \\ P_i -x & 2x & x & x = \frac{P_i - P_i}{2} \end{array}$$

$$K = \frac{2.303}{t} \log \frac{P_i}{P_i - x} = \frac{2.303}{K} \log \frac{2P_i}{3P_i - P_i}$$

$$378. \text{ROR} = \frac{-d[\text{N}_2]}{dt} = \frac{-d[\text{H}_2]}{3dt} = \frac{d[\text{NH}_3]}{2dt}$$

$$\text{ROR} = \frac{d[\text{NH}_3]}{2dt}$$

$$\text{ROR} = \frac{2.5 \times 154}{2} = 1.25 \times 10^{-4}$$

$$\frac{-d[\text{H}_2]}{dt} = \frac{3}{2} \frac{d[\text{NH}_3]}{dt} = \frac{3}{2} \times 2.5 \times 10^{-4} = 3.75 \times 10^{-4}$$

$$379. \frac{dSO_3}{dt} = 1.6 \times 10^{-3} \text{ kg/min}$$

$$= \frac{1.6 \times 10^{-3} \times 1000}{80} \text{ mol/min}$$

$$\frac{-dSO_2}{2dt} = \frac{-dO_2}{dt} = \frac{dSO_3}{2dt}$$

$$\frac{-dSO_2}{dt} = \frac{dSO_3}{dt} = \frac{1.6}{80} \text{ mol/min}$$

$$\frac{-dSO_2}{dt} = \frac{1.6}{80} \text{ mol/min}$$

$$\frac{1.6}{80} \times 64 \times 10^{-3} \text{ kg/mol}$$

$$= 1.28 \times 10^{-3} \text{ mol/min}$$

$$380. \frac{\text{Exp(1)}}{\text{Exp(2)}} \frac{1.2 \times 10^{-3}}{2.4 \times 10^{-3}} = \frac{K(0.05)^x(0.05)^y}{K(0.10)^x(0.05)^y}$$

$$\frac{1}{2} = \left(\frac{1}{2}\right)^x \quad (x=1)$$

$$\frac{\text{Exp(1)}}{\text{Exp(3)}} \frac{1.2 \times 10^{-3}}{1.2 \times 10^{-3}} = \frac{K(0.05)^x(0.05)^y}{K(0.05)^x(0.10)^y}$$

$$1 = \left(\frac{1}{2}\right)^y \quad [y=0]$$

$$382. 10 \text{ gram} \xrightarrow{24 \text{ hrs}} 5 \text{ g} \xrightarrow{24 \text{ hrs}} 2.5 \text{ g} \xrightarrow{24 \text{ hrs}} 1.25 \text{ g} \xrightarrow{24 \text{ hrs}} 0.626 \text{ gram}$$

384. Rate constant is independent of concentration of Reactant.

$$385. \log K = \log A - \frac{E_a}{2.3RT}$$

$$\lim_{T \rightarrow \infty} \log K = \log A - \frac{E_a}{2.3RT}$$

$$= \log A$$

$$388. \text{unit of } K \quad \boxed{\text{mol}^{1-n} \text{L}^{n-1} \text{sec}^{-1}}$$

$$389. r = K(A)^1$$

$$t_2 = \frac{0.693}{K}$$

$$390. \boxed{t_2 \times \frac{1}{a^{n-1}}}$$

$$392. \Delta H = (E_a)_f - (E_a)_b$$

$$-38 = 20 - E_a$$

$$393. r = K(4)^{1/2}(2)^2$$

$$r = 2 \times 2 \times 2 \Rightarrow 8 \text{ times}$$

$$394. r = K(A_2)(B) \quad K \rightarrow \frac{(A_2)}{(A)^2} \quad (A_2) = K(A)^2$$

$$r = KK(A)^2(B)^1 \rightarrow n = 3$$

$$396. t = \frac{2.39}{K} \log \frac{9}{9}$$

$$t = \frac{2303}{K} \log \frac{9}{9/4} = \frac{2.303}{K} \log 4$$

$$398. (B)\% \Rightarrow \frac{K_B}{K_A + K_B} \times 100$$

$$403. 10 \text{ k} = 2.303 \log \frac{1}{1 - \frac{1}{4}} = 2.303 \log \frac{4}{3} \quad \dots(1)$$

$$tk = 2.303 \log \frac{1}{1 - \frac{1}{16}} = 2.303 \log \frac{16}{15} \quad \dots(2)$$

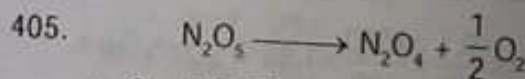
$$(1), (2) \quad \frac{t}{10} = \frac{(\log 16) - (\log 15)}{(\log 4) - (\log 3)} = \frac{0.028}{0.125}$$

$$\Rightarrow t = \frac{0.28}{0.125} \text{ min} = 2.24 \text{ min}$$

$$404. r = k[N_2O_5]^1$$

$$1.02 \times 10^{-4} = 3.4 \times 10^{-5} [N_2O_5]$$

$$\Rightarrow [N_2O_5] = \frac{1.02 \times 10^{-4}}{3.4 \times 10^{-5}} = 3M$$



$$t = 0 \quad 11MM \quad 0 \quad 0$$

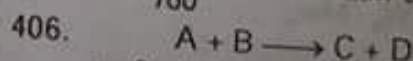
$$t = 20s \quad 114-x \quad x \quad \frac{x}{2}$$

$$\therefore 114 + \frac{x}{2} = 133 \Rightarrow x = 38 \text{ mm}$$

$$r = \frac{x}{t} = \frac{38}{20}$$

$$r = 1.9 \text{ mm sec}^{-1}$$

$$r = \frac{1.9}{760} = 2.5 \times 10^{-3} \text{ atm sec}^{-1}$$



$$t = 0 \quad 1M \quad 1M$$

$$r = k[A]^{1/2}[B]^{1/2}$$

if initial concentration of A & B are same then  $r = k(A)^1$

$$t = \frac{2.303}{2.303 \times 10^{-3}} \log \frac{1}{0.1} = 1000 \text{ sec.}$$

$$408. r_0 = k_0 [A]^0 = \frac{r_1}{r_0} = \frac{k_1}{k_0}$$

$$r_1 = k_1 [A]^1$$

$$\text{For zero order } (t_{1/2})_0 = \frac{[A]_0}{2k_0}$$

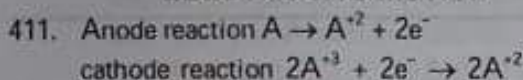
$$\text{For 1st order } (t_{1/2})_1 = \frac{0.693}{k_1}$$

$$\Rightarrow (t_{1/2})_0 (t_{1/2})_1$$

$$\frac{[A]_0}{2k_0} = \frac{0.693}{k_1}$$

$$\frac{k_1}{k_0} = \frac{2(0.693)}{[A]_0} = \frac{1.386}{1}$$

### ELECTROCHEMISTRY



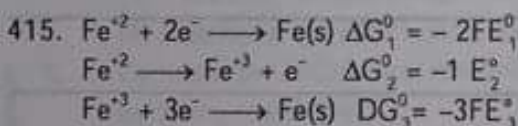
$$E^\circ_{\text{cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{Anode}} \\ = 0.4 - (-0.3) \\ = 0.7 \text{ V}$$

$$412. nFE^\circ = 2.303 RT \log K$$

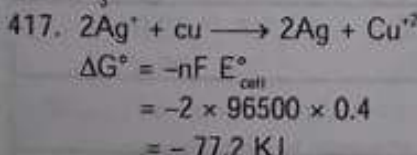
$$\log K = \frac{nFE^\circ}{2.303RT} = \frac{2 \times 96500 \times 1.5}{2.303 \times 8.3 \times 298} \\ K = 6.6 \times 10^{50}$$

413. oxidising power  $\propto$  SRP

$$414. \alpha = \frac{\Delta_m^\circ}{\Delta_m^\circ}, k_s = \frac{C\alpha^2}{1-\alpha}$$



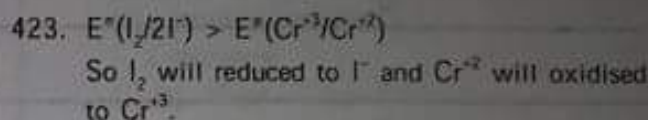
$$\Delta G_3^\circ = \Delta G_1^\circ - \Delta G_2^\circ \\ -3E^\circ_3 = 2 \times 0.447 - 1 \times 0.771 \\ E^\circ_3 = -0.041 \text{ V}$$



420.  $E^\circ_{\text{cell}}$  = positive  
 $\Delta G^\circ = nF E^\circ_{\text{cell}}$   
 $\Delta G^\circ$  = Negative  
 $\Delta G^\circ = -2.303 RT \log K_{\text{eq}}$   
 $\log K_{\text{eq}}$  = +ve value  
 $K_{\text{eq}} > 1$

421.  $E^\circ_{\text{cell}} = E^\circ_{\text{R.P.}} (\text{cathode}) - E^\circ_{\text{R.P.}} (\text{Anode})$   
 $= 1.428 - (-2.714)$   
 $= 4.142 \text{ V}$

422. Reducing power  $\propto$  S.O.P.  $\propto \frac{1}{\text{S.R.P.}}$



424. According to Kohtrausch law

$$\Lambda^\circ_m(\text{CH}_3\text{COONa}) + \Lambda^\circ_m(\text{HCl}) - \Lambda^\circ_m(\text{NaCl})$$

426. According to faraday's second law

$$\frac{W_{\text{Cu}}}{E_{\text{Cu}}} = \frac{W_{\text{O}_2}}{E_{\text{O}_2}} \Rightarrow W_w = 31.75 \text{ g}$$



0.1 mole                      0.6 mole  
Charge required =  $0.6 F = 0.6 \times 96500$   
 $= 57900C$



$$E = E^\circ - \frac{2.303 \times 8.314 \times 323}{2 \times 96500} \log \frac{P_{H_2}}{[H^+]^2}$$

$$O = O - \frac{2.303 \times 8.314 \times 323}{2 \times 96500} \log \frac{P_{H_2}}{[H^+]^2}$$

$$\frac{P_{H_2}}{10^{-14}} = 1$$

$$pH_2 = 10^{-14} \text{ atm}$$

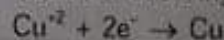
431.  $Q = ne = It$

$$h = \frac{I \times t}{e} = \frac{2 \times 120}{1.6 \times 10^{-19}} = 1.5 \times 10^{20} \text{ electron}$$

434.  $E^\circ_{\text{cell}} = 0.8 - 0.77 = 0.03 \text{ V}$   
 $\Delta G^\circ = -nFE^\circ_{\text{cell}} = -1 \times 96500 \times 0.03$   
 $= -2895 \text{ J/mol}$

436.  $Q = I \times t$   
 $= 1.5 \times 10 \times 60$   
 $= 900C$

Reaction occurring at the cathode is



$2F = 2 \times 96500$  deposit 1 mole  $Cu(63.5g)$   
 $= 0.296 \text{ g}$

440. Metal ion having higher SRP is displaced by lower SRP metal.

# IMPORTANT NOTES

# INORGANIC CHEMISTRY

## PERIODIC TABLE

- Is atomic numbers 117, 120 is discovered then their blocks will be:  
(1) s, p (2) p, s (3) p, d (4) d, p
- Increasing order of metallic character will be  
(1)  $P < Si < Be < Mg < Na$   
(2)  $P > Si > Be > Mg > Na$   
(3)  $P < Si < Be > Mg < Na$   
(4)  $P > Si < Be < Mg < Na$
- Among the following largest and smallest size will be  $Mg, Mg^{+2}, Al, Al^{3+}$   
(1)  $Mg^{+2}, Al^{3+}$  (2)  $Al^{3+}, Mg^{+2}$   
(3)  $Al^{3+}, Mg$  (4)  $Mg, Al^{3+}$
- The first I.E. values of third period elements Na; Mg, Si are respectively 496, 737, 786 KJ mol<sup>-1</sup> then first IE of Al will be close to  
(1) 760 KJ mol<sup>-1</sup> (2) 830 KJ mol<sup>-1</sup>  
(3) 575 KJ mol<sup>-1</sup> (4) 1050 KJ mol<sup>-1</sup>
- Among P, S, Cl, F most and least negative  $\Delta H_{eg}$  will be of:  
(1) Cl, P (2) P, Cl (3) Cl, F (4) F, Cl
- The following order is valid for  $Li < B < Be < C < O < N < F < Ne$   
(1) IE (2) EGE (3) EN (4) size
- $OF_2$  is  
(1) Oxide of fluorine  
(2) Fluoride of oxygen  
(3) It is a inter halogen compound  
(4) It cannot act as a fluorinating agent
- Correct order of Chemical reactivity in terms of oxidizing property is:  
(1)  $F > Cl > O > N$  (2)  $F > O > Cl > N$   
(3)  $Cl > F > O > N$  (4)  $O > F > N > Cl$
- Highest floroanion of Boron and Aluminium is:  
(1)  $BF_6^{3-}, AlF_6^{3-}$  (2)  $BF_4^-, AlF_6^-$   
(3)  $BF_4^-, AlF_6^{3-}$  (4)  $BF_4^-, AlF_4^-$
- The most fundamental property for the classification of elements is  
(1) Atomic No. (2) Atomic Mass  
(3) No. of Nucleons (4) None of these
- e<sup>-</sup> configuration of  $_{90}Th$   
(1)  $(n-2)f^2, (n-1)d^1 ns^1$   
(2)  $(n-2)f^1, (n-1)d^1 ns^2$   
(3)  $(n-2)f^0, (n-1)d^2 ns^2$   
(4)  $(n-2)f^2, (n-1)d^0 ns^2$
- Match the column -  
Column-1 Column-2  
(a)  $Z = 120$  (P) Sg  
(b) Seaborg's group (Q) B  
(c) Non metal (R) Placed in g.p. = 2  
(d) Lawrence Berkeley(S) Lr  
Laboratory  
(1) (a) - R (b) - Q (c) - P (d) - S  
(2) (a) - R (b) - P (c) - Q (d) - S  
(3) (a) - S (b) - P (c) - R (d) - Q  
(4) (a) - Q (b) - R (c) - P (d) - S
- Which of the following is not an actinoid?  
(1) Curium (Cm) (2) Californium (Cf)  
(3) Uranium (U) (4) Terbium (Tb)
- Which order for atomic radii is incorrect?  
(1)  $H^+ > Li^+ > Mg^{+2} > Al^{+3}$   
(2)  $MnO_2 > KMnO_4$   
(3)  $O^{2-} > F^- > Na^+ > Mg^{+2}$   
(4)  $B > Al < Ga < In = Tl$
- Which is not incorrect for acidic strength?  
(1)  $H_2S < H_2Se < H_2Te$   
(2)  $HClO_4 > HClO_3 > HClO_2 > HClO$   
(3)  $P_4O_{10} > SiO_2$   
(4) All are correct
- Which is incorrect?  
(1)  $Na < Al < Mg < Si$  IP<sub>1</sub> order  
(2)  $V < Cr < Fe < Mn$  IP<sub>3</sub> order  
(3)  $P < Si < Be < Mg < Na$  Metallic Character  
(4)  $Yb > Ce > Lu > Sn$  order of atomic radius
- Which is correct for  $\Delta H_{eg}$ ?  
(1)  $Cl > F > Br > I > S$  (2)  $O^- > O > O^+$   
(3)  $S^- > O^-$  (4)  $Cl > F > S > O > N > P$
- Match the column -  
Column I Column II  
(a)  $N_2O$  (P) Normal Oxide  
(b)  $Na_2O$  (Q) Neutral Oxide  
(c)  $Ga_2O_3$  (R) Sub Oxide  
(d)  $C_3O_2$  (S) Basic Oxide  
(e)  $V_2O_5$  (T) Amphoteric Oxide  
(U) Mixed Oxide  
(1) (a) - Q, (b) - P, S (c) - R, (d) - T, (e) - U  
(2) (a) - Q (b) - P, S (c) - T, (d) - R, (e) - U  
(3) (a) - R, P (b) - Q, S (c) - U, (d) - T, (e) - R  
(4) (a) - P, Q (b) - R, S (c) - T, (d) - U, (e) - R



41. Amongst the following elements whose electronic configuration is given below, the one having highest ionisation enthalpy is  
(1)  $[\text{Ne}]3s^23p^1$  (2)  $[\text{Ne}]3s^23p^3$   
(3)  $[\text{Ne}]3s^23p^2$  (4)  $[\text{Ar}]3d^{10}4s^24p^3$

### CHEMICAL BONDING

42. Which of the following molecule/species have a same bond order as that of  $\text{O}_2^{+1}$ ?  
(1) NO (2)  $\text{N}_2^+$   
(3)  $\text{N}_2^{+1}$  (4) All of these
43. Which of the following molecule/species are Iso-structural with  $\text{N}_3^-$  ion?  
(1)  $\text{I}_3^-$  (2)  $\text{I}_3^+$  (3)  $\text{NH}_2^-$  (4)  $\text{HCO}_2^-$
44. Which of the following pair of species are Iso-electronic?  
(1)  $\text{CN}^-$  &  $\text{NO}^+$  (2)  $\text{N}_2^-$  &  $\text{N}_2^+$   
(3)  $\text{H}_2^+$  &  $\text{H}_2^-$  (4) CO &  $\text{NO}^+$
45. Which of the following molecule is/are Hypovalent?  
(1)  $\text{AlF}_3$  (2)  $\text{ICl}_2^+$   
(3)  $\text{BCl}_3$  (4)  $\text{ICl}_2^-$
46. Determine the Bond order & formal charge on each oxygen atom in  $\text{HCO}_2^-$  Respectively?  
(1) 1.5, -0.5 (2) 2, -0.5  
(3) 1.33, -1.5 (4) 1.5, -1.33
47. Determine the incorrect order of Bond angle?  
(1)  $\text{NH}_3 < \text{NF}_3 < \text{NCl}_3$  (2)  $\text{OF}_2 < \text{OH}_2 < \text{OCl}_2$   
(3)  $\text{SF}_2 < \text{SCl}_2 < \text{SBr}_2 < \text{SI}_2$  (4)  $\text{ClO}_2 > \text{ClO}_2^- < \text{OCl}_2$
48. Which of the following molecule is/are non-polar & planar?  
(1)  $\text{XeF}_4$  (2)  $\text{NH}_2^+$   
(3)  $\text{PF}_3\text{Cl}_2$  (4)  $\text{PCl}_3\text{F}_2$
49. For Which of the following molecule H.E. is Higher than its L.E.?  
(1)  $\text{BeSO}_4$  (2)  $\text{BaSO}_4$   
(3)  $\text{CaSO}_4$  (4)  $\text{SrSO}_4$
50. Which of the following has maximum no. of lone pair at central atom?  
(1)  $\text{XeF}_2$  (2)  $\text{XeF}_4$   
(3)  $\text{XeF}_6$  (4)  $\text{XeO}_2\text{F}_2$
51. Dative Bond is present in -  
(1)  $\text{KNO}_2$  (2)  $\text{KHF}_2$   
(3)  $\text{KI}_3$  (4)  $\text{AlI}$
52. Which is iso-structural?  
(1)  $\text{XeF}_2$ ,  $\text{ICl}_2^+$ ,  $\text{ClF}_3$  (2)  $\text{ClF}_3$ ,  $\text{PCl}_3$ ,  $\text{NCl}_3$   
(3)  $\text{CO}_2$ ,  $\text{XeF}_2$ ,  $\text{I}_3^-$  (4)  $\text{PCl}_5$ ,  $\text{XeOF}_4$ ,  $\text{ICl}_5$
53. Which of the following mol. have both  $\pi\pi$  -  $\pi\pi$  and  $\pi\pi$  -  $d\pi$  Bonding?  
(1)  $\text{ClO}_2^+$  (2)  $\text{NO}_2^+$   
(3)  $\text{SO}_3^{2-}$  (4)  $\text{ClO}_4^-$
54. Select correct order out of given options-  
(1)  $\text{BeCO}_3 < \text{BaCO}_3 \rightarrow$  Covalent character  
(2)  $\text{BeO} > \text{SrO} \rightarrow$  Lattice energy  
(3)  $\text{Be}^{2+} < \text{Li}^+ \rightarrow$  Hydration energy  
(4)  $\text{Be}_{(\text{aq})}^{2+} > \text{Li}_{(\text{aq})}^+ \rightarrow$  Ionic Mobility
55. Which of the following one of the following is least soluble in Acetone?  
(1)  $\text{AgCl}$  (2)  $\text{NaCl}$   
(3)  $\text{CCl}_4$  (4)  $\text{LiCl}$
56. Bond length and Bond energy order is same for-  
(1)  $\text{C} - \text{C} > \text{Si} - \text{Si} > \text{Ge} - \text{Ge}$   
(2)  $\text{N} - \text{N} > \text{O} - \text{O} > \text{F} - \text{F}$   
(3)  $\text{C} - \text{N} > \text{C} - \text{O} > \text{C} - \text{F}$   
(4)  $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$
57. Which one is Highest melting Halide?  
(1)  $\text{NaCl}$  (2)  $\text{LiCl}$   
(3)  $\text{LiBr}$  (4)  $\text{NaI}$
58. If  $\text{AB}_4^n$  type species are tetrahedral, the Which of the following is/are.  
Incorrectly Match :-  

	A	B	n
(1)	Xe	O	Zero
(2)	Se	F	Zero
(3)	P	O	-3
(4)	N	H	+1
59. The species having no.  $\pi\pi$  -  $\pi\pi$  bond but his bond order equal to that of  $\text{O}_2^-$   
(1)  $\text{ClO}_3^-$  (2)  $\text{PO}_4^{3-}$   
(3)  $\text{SO}_4^{2-}$  (4)  $\text{XCO}_3$

60. How many  $\pi$ -bond does  $C_2$  have?  
 (1) 1 (2) 2  
 (3) 0 (4) 3
61. Which of the following mol. is Least Volatile?  
 (1) HF (2) HCl  
 (3) HBr (4) HI
62. Match the following and choose the correct option given below.  
 (a)  $N_2 \rightarrow N_2^+$  (p) bond order increase  
 (b)  $N_2 \rightarrow N_2^-$  (q) bond order decrease  
 (c)  $O_2 \rightarrow O_2^+$  (r) paramagnetism increase  
 (d)  $O_2 \rightarrow O_2^-$  (s) paramagnetism decrease  
 (t) No change in bond order  
 (1) a - (q, r), b - (q, r), c - (p, s), d - (q, s)  
 (2) a - (q, s), b - (q, s), c - (p, s), d - (q, r)  
 (3) a - (p, q), b - (q, s), c - (p, r), d - (q, t)  
 (4) a - (p, s), b - (q, p), c - (q, t), d - (q, t)
63. Which pair(s) has same bond angle?  
 (a)  $BF_3$ ,  $BCl_3$  (b)  $PO_4^{3-}$ ,  $SO_4^{2-}$  (c)  $BF_3$ ,  $PF_3$   
 (d)  $NO_2^+$ ,  $N_2O$  (e)  $N_3^-$ ,  $NO_2$   
 correct option are -  
 (1) a, b, d (2) b, d  
 (3) b, c, d (4) a, d, e
64. Which is correct?  
 (1)  $PbS > ZnS$  (Solubility)  
 (2)  $Li_2CO_3 > Na_2CO_3$  (Thermal Stability)  
 (3)  $NaF > KF$  (Lattice energy)  
 (4)  $BaSO_4 > MgSO_4$  (Solubility)
65. Which among the following attraction is strongest?  
 (1)  $HF \cdots H_2O$  (2)  $Na^+ \cdots H \cdots Cl$   
 (3)  $H_2O \cdots Cl_2$  (4)  $Cl-Cl \cdots Cl-Cl$
66. Among the following, the pair in which the two species are not ISO-structural is  
 (1)  $IO_3^-$  and  $NH_3$  (2)  $BH_4^-$  and  $NH_4^+$   
 (3)  $PF_6^-$  and  $SF_6$  (4)  $SiF_4$  and  $SF_4$
67. Which of the following species contains only  $\pi$  bond?  
 (1)  $CN^-$  (2)  $CO$   
 (3)  $C_2$  (4)  $O_2^+$
68. Correct order of strength of H-bond  
 (1)  $H_2O > H_2O_2$  (2)  $H_2O < H_2O_2$   
 (3)  $HF < H_2O$  (4)  $NH_3 > HF$
69.  $XeF_2$  is isostructural with  
 (1)  $CH_4$  (2)  $I_3^-$   
 (3)  $I_3^+$  (4)  $CCl_4$
70. Hydration energy of  $Mg^{2+}$  is higher than  
 (1)  $Be^{2+}$  (2)  $Na^+$   
 (3)  $Al^{3+}$  (4) All of these
71. Total number of sp hybridised C-atoms in the following Hydrocarbon will be:  
 $H_3C-C \equiv C-CH=CH_2$   
 (1) 5 (2) 4 (3) 2 (4) 1
72. Match the column  

Column I	Column II
(a) $C_2H_2$	(P) $sp^3d$ hybridisation
(b) $SO_2$	(Q) $sp^3$ hybridisation
(c) $I_3^-$	(R) $sp^2$ hybridisation
(d) $NH_4^+$	(S) $sp$ hybridisation

 (1) (a) S (b) P (c) R (d) Q  
 (2) (a) P (b) S (c) R (d) Q  
 (3) (a) S (b) R (c) P (d) Q  
 (4) (a) R (b) S (c) P (d) Q
73. Match the column  

Column I (Compound)	Column II (Examples)
(a) Covalent	(P) $SiO_2$ , $CH_4$
(b) Molecular	(Q) $CaO$
(c) Ionic	(R) $CCl_4$
(d) Metallic	(S) Bronze

 (1) (a) P (b) Q (c) R (d) S  
 (2) (a) R (b) P (c) Q (d) S  
 (3) (a) S (b) P (c) Q (d) R  
 (4) (a) P (b) R (c) Q (d) S
74. Match the column  

Compound	No. of $\sigma$ & $\pi$ Bonds
(a) $H_2S_2O_3$	(P) 6 $\sigma$ & 2 $\pi$
(b) $H_2SO_5$	(Q) 11 $\sigma$ & 4 $\pi$
(c) $H_2S_2O_8$	(R) 9 $\sigma$ & 4 $\pi$
(d) $H_2S_2O_6$	(S) 7 $\sigma$ & 2 $\pi$

 (1) (a) S (b) P (c) Q (d) R  
 (2) (a) P (b) S (c) Q (d) R  
 (3) (a) P (b) Q (c) R (d) S  
 (4) (a) Q (b) S (c) P (d) R

75. Match the column

Compound	Shape
(a) $\text{XeO}_2\text{F}_2$	(P) Linear
(b) $\text{XeF}_5^-$	(Q) Square Planar
(c) $\text{I}_3^-$	(R) See-Saw
(d) $\text{XeF}_4$	(S) Pentagonal Planar
(1) (a) R (b) S (c) P (d) Q	
(2) (a) R (b) S (c) Q (d) P	
(3) (a) P (b) S (c) Q (d) R	
(4) (a) S (b) Q (c) P (d) R	

76. Which is incorrect?

- (1) Dipole moment order  $\rightarrow \text{CH}_4 < \text{NF}_3 < \text{NH}_3 < \text{H}_2\text{O}$
- (2) For  $\text{PCl}_5$  molecule  $\rightarrow \text{B.L.}_{\text{equatorial}} < \text{B.L.}_{\text{axial}}$
- (3) Melting point order  $\rightarrow \text{H}_2\text{O}_{(s)} > \text{NH}_{3(s)} > \text{HF}_{(s)}$
- (4) no. of unpaired  $e^-$  in  $\text{H}_2\text{O}_2 = 1$

77. Which is correct?

- (1) Bond order  $\rightarrow \text{CO} > \text{CO}_3^{2-}$
- (2) Bond Angle  $\rightarrow \text{PH}_3 > \text{PF}_3$
- (3) Bond energy  $\rightarrow \text{Cl}_2 > \text{Br}_2 > \text{I}_2 > \text{F}_2$
- (4) Bond length order  $\rightarrow \text{C-C} < \text{N-N} < \text{O-O} < \text{F-F}$

78. Which is not correct?

- (1) White vitriol and epsom salt are isomorphous
- (2) Thermal Stability  
 $\rightarrow \text{BeCO}_3 < \text{MgCO}_3 < \text{CaCO}_3 < \text{SrCO}_3$
- (3) Solubility  
 $\rightarrow \text{NaHCO}_3 < \text{KHCO}_3 < \text{RbHCO}_3 < \text{CsHCO}_3$
- (4) Melting Point  $\rightarrow \text{Al}_2\text{O}_3 < \text{MgF}_2$

79. Which molecule does not exist?

- (1)  $\text{MnF}_4$
- (2)  $\text{SH}_6$
- (3)  $(\text{BCl}_2)_2$
- (4) 2 & 3 both

80. Which is correct?

- (1) Ionic mobility in aqueous medium  
 $\rightarrow \text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Rb}^+$
- (2) Covalent character  
 $\rightarrow \text{KCl} > \text{CaCl}_2 > \text{AlCl}_3 > \text{SnCl}_4$
- (3) Boiling point order  $\rightarrow \text{H}_2\text{O} > \text{H}_2\text{Se} > \text{H}_2\text{Te} > \text{H}_2\text{S}$
- (4) Dipole - dipole attraction  $\rightarrow \text{KCl} + \text{H}_2\text{O}$

81. Which is not incorrect?

- (1) Lewis dot structure stability order  

$$\begin{array}{c} \text{O} \\ \parallel \\ \text{H}-\text{O}-\text{S}-\text{O}-\text{H} \\ \parallel \\ \text{O} \end{array} < \begin{array}{c} \text{O} \\ \uparrow \\ \text{H}-\text{O}-\text{S}-\text{O}-\text{H} \\ \downarrow \\ \text{O} \end{array}$$
- (2) In  $\text{XeF}_6(\text{s})$  Hybridisation of anion  $\rightarrow \text{sp}^3\text{d}$
- (3) For  $\text{O}_2$  molecule bond order is 2.0
- (4) Bond angle order  $\text{CF}_4 < \text{CH}_4$

82. Match column-I and Column-II

Column-I	Column-II
(A) $\text{SF}_4$	(1) tetrahedral
(B) $\text{BrF}_3$	(2) pyramidal
(C) $\text{BrO}_3^-$	(3) See-saw
(D) $\text{NH}_4^+$	(4) Bent-T

Code :

- (1) A (3), B (2), C (1), D (4)
- (2) A (3), B (4), C (2), D (1)
- (3) A (2), B (4), C (3), D (1)
- (4) A (1), B (4), C (2), D (3)

83. Consider the following order

- (1)  $\text{PH}_3 > \text{NH}_3 > \text{AsH}_3$  (basic character)
  - (2)  $\text{PH}_3 > \text{NH}_3 > \text{AsH}_3$  (boiling point)
  - (3)  $\text{HOCl} > \text{HClO}_2 > \text{HClO}_3 > \text{HClO}_4$   
(oxidising property)
  - (4)  $\text{HF} > \text{HCl} > \text{HBr} > \text{HI}$  (acidic)
  - (5)  $\text{H}_2\text{O} > \text{H}_2\text{S} > \text{H}_2\text{Se}$  (bond angle)
  - (6)  $\text{H}_2\text{SO}_4 > \text{H}_3\text{PO}_4 > \text{H}_2\text{CO}_3$  (acidic character)
- correct order(s) are
- (1) 1,2,4,5
  - (2) 2,3,5,6
  - (3) 3,5,6
  - (4) 4,5,6

84. Which solubility order is correct

- (1)  $\text{BaSO}_4 > \text{SrSO}_4 > \text{CaSO}_4 > \text{MgSO}_4$
- (2)  $\text{ZnS} > \text{Na}_2\text{S} > \text{CoS}$
- (3)  $\text{BaCO}_3 > \text{MgCO}_3 > \text{Na}_2\text{CO}_3$
- (4)  $\text{KOH} > \text{NaOH} > \text{Mg(OH)}_2$

85. What is incorrect about reaction of  $\text{NH}_3$  and  $\text{BF}_3$ ?

- (1) hybridisation of both N & B change
- (2) It is an example of redox change
- (3) In the final adduct formed, back bonding appears between B & N
- (4) All

86. In molecule / ion there are more than 1 type of XO bond lengths

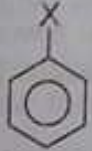
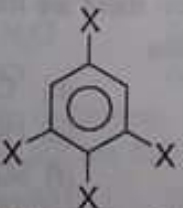
- $\text{NO}_3^-$
- $\text{Cr}_2\text{O}_7^{2-}$
- $\text{HCOO}^-$
- $\text{HClO}_3$
- $\text{PO}_4^{3-}$
- $\text{SO}_4^{2-}$

correct code is

- (1) a,b,d
- (2) b,d
- (3) b,c,d,f
- (4) a,b,c,f

87. Correct order of dipole moment is

- (1)  $\text{CH}_3\text{Cl}, \text{CH}_3\text{Br}, \text{CH}_3\text{F}$
- (2)  $\text{CH}_3\text{F}, \text{CH}_3\text{Cl}, \text{CH}_3\text{Br}$
- (3)  $\text{CH}_3\text{Cl}, \text{CH}_3\text{F}, \text{CH}_3\text{Br}$
- (4)  $\text{CH}_3\text{Br}, \text{CH}_3\text{Cl}, \text{CH}_3\text{F}$

88. Correct order of stability of species  
 $N_2, N_2^+, N_2^-$   
 (1)  $N_2 > N_2^+ = N_2^-$  (2)  $N_2 > N_2^+ > N_2^-$   
 (3)  $N_2 > N_2^- > N_2^+$  (4)  $N_2^+ > N_2 > N_2^-$
89. Isostructural species are those which have same shape & hybridisation. Among the following pair identify isostructural pairs.  
 (1)  $[NF_3]$  &  $[BF_3]$  (2)  $[BF_4^-]$  &  $[NH_4^+]$   
 (3)  $[BCl_3]$  &  $[BrCl_3]$  (4)  $[NH_3]$  &  $[NO_3^-]$
90. Which is not stable  
 (1)  $KHF_2$  (2)  $KI_3$   
 (3)  $CH_3-CH(OH)_2$  (4)  $Cl_3C-CH(OH)_2$
91. Which of the following compound give metal and oxygen gas at high temperature  
 (1)  $NaNO_3$  (2)  $Ag_2CO_3$   
 (3)  $K_2CO_3$  (4)  $Li_2CO_3$
92.  $KF$  combines with  $HF$  to form  $KHF_2$ . The compound  $KHF_2$  contains the species  
 (1)  $K^+, F^-, H^+$  (2)  $K^+, F^-, HF$   
 (3)  $K^+, [HF_2]^-$  (4)  $F_2, [KHF]^+$
93. Which of the following represent most effective  $\pi$ -bond  
 (1)  $2p\pi-3p\pi$  (2)  $3d\pi-3d\pi$   
 (3)  $2p\pi-3d\pi$  (4)  $3d\pi-3p\pi$
94. In which reaction hybridisation of underline atom does not changed  
 (1)  $\underline{B}F_3 + F^- \rightarrow BF_4^-$   
 (2)  $\underline{N}H_3 + H^+ \rightarrow NH_4^+$   
 (3)  $\underline{B}F_3 + NH_3 \rightarrow BF_3 \cdot NH_3$   
 (4)  $\underline{Si}F_4 + 2F^- \rightarrow SiF_6^{2-}$
95. Dipole moment of  is 1.5 D. The dipole moment of  will be  
 (1) 1.5 D (2) 3.0 D (3) 1.0 D (4) 2.35 D
96. Which of the following compound has non-zero dipole moment  
 (1)  $XeF_4$  (2)  $B_2H_6$  (3)  $PF_3Cl_2$  (4)  $PCl_3F_2$
97. Which of the following molecule is planar due to back bonding  
 (1)  $NCI_3$  (2)  $PF_3$  (3)  $BF_3$  (4) None
98. Amongst the following, molecule having maximum bond angles of  $90^\circ$  is  
 (1)  $XeF_4$  (2)  $XeF_6$  (3)  $SF_6$  (4)  $IF_7$
99. Which of the following statement is incorrect  
 (1) Removal of an electron is easier from  $O_2$  in comparison to  $O_2^{2-}$   
 (2) In the double bond of  $C_2$  molecule, both are  $\pi$ -bonds  
 (3)  $NO$  is more stable than  $NO^+$   
 (4)  $NO_2^+$  and  $CO_2$  are isoelectronic and isostructural
100. The coordinate bond is absent in  
 (1)  $NaNO_3$  (2)  $CaCO_3$  (3)  $O_3$  (4)  $KNC$
101. Which of the following is least stable  
 (1)  $O^-$  (2)  $C^-$  (3)  $B^-$  (4)  $Be^-$
102. The hybridisation of Si in silicon dioxide (silica) is  
 (1)  $sp$  (2)  $sp^2$  (3)  $sp^3$  (4)  $dsp^2$
103. The bond order for  $NO$  and  $NO^+$ , respectively is  
 (1) 3.0, 2.5 (2) 2.5, 3.0  
 (3) 3.0, 3.0 (4) 2.5, 2.5
104. Back bonding always changes  
 (1) bond angle  
 (2) hybridisation of central atom  
 (3) planarity  
 (4) bond length
105. Bond angle in  $H_2O$  is  
 (1)  $104.5^\circ$  (2)  $120^\circ$  (3)  $109.5^\circ$  (4)  $107^\circ$
106. The correct stability order of  $N_2$  and its given ions is  
 (1)  $N_2 > N_2^+ > N_2^- > N_2^{2-}$   
 (2)  $N_2^- > N_2^+ > N_2^- > N_2^{2-}$   
 (3)  $N_2^+ > N_2^- > N_2 > N_2^{2-}$   
 (4)  $N_2 > N_2^+ = N_2^- > N_2^{2-}$
107. Among  $LiCl$ ,  $BeCl_2$ ,  $BCl_3$  and  $CCl_4$  the covalent bond character follows the order  
 (1)  $LiCl > BeCl_2 > BCl_3 > CCl_4$   
 (2)  $LiCl < BeCl_2 < BCl_3 < CCl_4$   
 (3)  $LiCl > BeCl_2 > CCl_4 > BCl_3$   
 (4)  $LiCl < BeCl_2 < BCl_3 > CCl_4$
108. In  $XeF_2$ ,  $XeF_4$  and  $XeF_6$  the number of lone pairs of electron on  $Xe$  are respectively  
 (1) 2, 3, 1 (2) 1, 2, 3 (3) 4, 1, 2 (4) 3, 2, 1
109. Which one is most soluble in water  
 (1)  $Mg(OH)_2$  (2)  $Sr(OH)_2$   
 (3)  $Ca(OH)_2$  (4)  $Ba(OH)_2$

110. The correct order of N-O bond length is  
 (1)  $\text{NO}_3^- > \text{NO}_2^+ > \text{NO}_2^-$   
 (2)  $\text{NO}_3^- > \text{NO}_2^- > \text{NO}_2^+$   
 (3)  $\text{NO}_2^+ > \text{NO}_3^- > \text{NO}_2^-$   
 (4)  $\text{NO}_2^- > \text{NO}_3^- > \text{NO}_2^+$
111. The correct order of A-O-A bond angle of (A=H, F or Cl)  
 (1)  $\text{H}_2\text{O} > \text{Cl}_2\text{O} > \text{F}_2\text{O}$  (2)  $\text{Cl}_2\text{O} > \text{H}_2\text{O} > \text{F}_2\text{O}$   
 (3)  $\text{F}_2\text{O} > \text{Cl}_2\text{O} > \text{H}_2\text{O}$  (4)  $\text{F}_2\text{O} > \text{H}_2\text{O} > \text{Cl}_2\text{O}$
112. Correct order of dipole moment is  
 (1)  $\text{CH}_3\text{Cl} > \text{CH}_3\text{F} > \text{CH}_3\text{Br} > \text{CH}_3\text{I}$   
 (2)  $\text{CH}_3\text{F} > \text{CH}_3\text{Cl} > \text{CH}_3\text{Br} > \text{CH}_3\text{I}$   
 (3)  $\text{CH}_3\text{Cl} > \text{CH}_3\text{Br} > \text{CH}_3\text{I} > \text{CH}_3\text{F}$   
 (4)  $\text{CH}_3\text{F} > \text{CH}_3\text{Cl} > \text{CH}_3\text{I} > \text{CH}_3\text{Br}$
113. Which of the following has fractional bond order  
 (1)  $\text{O}_2^{2+}$  (2)  $\text{O}_2^{2-}$  (3)  $\text{F}_2^{2-}$  (4)  $\text{H}_2^-$
114. When  $\text{AgNO}_3$  is heated strongly, the product formed are  
 (1) NO and  $\text{NO}_2$  (2)  $\text{NO}_2$  and  $\text{O}_2$   
 (3)  $\text{NO}_2$  and  $\text{N}_2\text{O}$  (4) NO and  $\text{O}_2$
115. Which of the following carbonate of a metals has the least thermal stability  
 (1)  $\text{Li}_2\text{CO}_3$  (2)  $\text{K}_2\text{CO}_3$   
 (3)  $\text{Cs}_2\text{CO}_3$  (4)  $\text{Na}_2\text{CO}_3$
116. The correct order of melting point is  
 (1)  $\text{LiCl} > \text{NaCl} > \text{KCl} < \text{CsCl}$   
 (2)  $\text{LiCl} > \text{NaCl} > \text{KCl} > \text{CsCl}$   
 (3)  $\text{NaCl} > \text{KCl} > \text{CsCl} > \text{LiCl}$   
 (4)  $\text{LiCl} > \text{NaCl} > \text{CsCl} > \text{KCl}$
117. The state of hybridisation for the transition state of hydrolysis mechanism of  $\text{BCl}_3$  and  $\text{SF}_6$  are respectively  
 (1)  $\text{sp}^2, \text{sp}^3\text{d}$  (2)  $\text{sp}^3, \text{sp}^3$   
 (3)  $\text{sp}^3, \text{sp}^3$  (4)  $\text{sp}^3, \text{sp}^3\text{d}^2$
118. The dipole moment of  $\text{AX}_3$ ,  $\text{BX}_3$  and  $\text{CY}_3$  are  $4.97 \times 10^{-30}$ ,  $0.60 \times 10^{-30}$  and  $0.00 \text{ Cm}$  respectively then the shape of molecule may be  
 (1) pyramidal, T-shape, trigonal planar  
 (2) pyramidal, trigonal planar, T-shape  
 (3) T-shape, pyramidal, trigonal planar  
 (4) pyramidal, T-shape, linear
119. The bond strength in  $\text{O}_2^+$ ,  $\text{O}_2$ ,  $\text{O}_2^-$  &  $\text{O}_2^{2-}$  follows the order:  
 (1)  $\text{O}_2^{2-} > \text{O}_2^- > \text{O}_2 > \text{O}_2^+$   
 (2)  $\text{O}_2^+ > \text{O}_2 > \text{O}_2^- > \text{O}_2^{2-}$   
 (3)  $\text{O}_2 > \text{O}_2^- > \text{O}_2^{2-} > \text{O}_2^+$   
 (4)  $\text{O}_2^- > \text{O}_2^{2-} > \text{O}_2^+ > \text{O}_2$
120. A compound which leaves behind no residue on heating is  
 (1)  $\text{Cu}(\text{NO}_3)_2$  (2)  $\text{KNO}_3$   
 (3)  $\text{NH}_4\text{NO}_3$  (4) None of these
121. Which of the following molecule is polar and non-planar  
 (1)  $\text{XeF}_4$  (2)  $\text{XeF}_6$  (3)  $\text{CH}_2\text{F}_2$  (4)  $\text{ClF}_3$
122. Dipole moment of  $\text{NH}_3$  is more than  $\text{NF}_3$  because  
 (1) N-F bond is more polar than N-H bond  
 (2)  $\text{NH}_3$  is pyramidal while  $\text{NF}_3$  is planar  
 (3) In  $\text{NH}_3$  orbital dipole due to lone pair is in the same direction as the resultant dipole moment of N-H bonds while in  $\text{NF}_3$  orbital dipole due to lone pair is opposite direction of the resultant dipole moment of N-F bonds  
 (4) None of these
123. Which of the following pairs of ions are isoelectronic and isostructural  
 (1)  $\text{CO}_3^{2-}, \text{NO}_2^-$  (2)  $\text{ClO}_3^-, \text{CO}_3^{2-}$   
 (3)  $\text{SO}_3^{2-}, \text{NO}_3^-$  (4)  $\text{ClO}_3^-, \text{SO}_3^{2-}$
124. Which of the pair is having planar structure  
 (1)  $\text{SF}_6, \text{XeF}_4$  (2)  $\text{H}_3\text{O}^+, \text{SO}_2$   
 (3)  $\text{BF}_3, \text{XeOF}_2$  (4)  $\text{XeF}_4, \text{NO}_3^-$
125. Ammonia is soluble in water but phosphine is insoluble because  
 (1) phosphine has higher molecular mass than ammonia  
 (2) ammonia is polar while phosphine is non polar  
 (3) Ammonia forms inter molecular H-bond with water but not phosphine  
 (4) Ammonia is ionic while phosphine is covalent
126. Which of the following resist hydrolysis at room temperature  
 (1)  $\text{PCl}_3, \text{SF}_6$  (2)  $\text{CCl}_4, \text{NO}_2$   
 (3)  $\text{PCl}_5, \text{XeF}_6$  (4)  $\text{SF}_6, \text{CCl}_4$
127. Which of the following is polar  
 (1) p-dichlorobenzene (2) trans-1-chloropropene  
 (3) boron tri fluoride (4) xenon tetra fluoride

128. Which molecule / ion out of the following does not contain unpaired electrons?  
 (1)  $N_2^+$  (2)  $O_2$  (3)  $O_2^{2-}$  (4)  $B_2$

129. Which of following molecule is having shortest bond length

(1)  $O_2^+$  (2)  $O_2^{2-}$  (3)  $O_2$  (4) All have

### S-BLOCK ELEMENTS

130. Which of the following isn't considered as alkaline earth metal?

(1) Be (2) Mg (3) Ca (4) Sr

131. The alkali metals & their salts impart characteristic colour to an:

(1) Oxidising flame (2) Reducing flame  
 (3) Both a & b (4) None of these

132. The pair of most abundant alkali metals is?

(1) Li & Na (2) Na & K  
 (3) K & Rb (4) Na & Rb

133. When alkali metals react with liquid ammonia the solution obtained is?

(1) Blue & non-Conducting  
 (2) Blue & Conducting  
 (3) Colourless & non-Conducting  
 (4) Colourless & Conducting

134. The products obtained on hydrolysis of superoxide

(1)  $MO_2 + H_2O \longrightarrow M^+ + OH^- + H_2O_2$   
 (2)  $MO_2 + H_2O \longrightarrow M^+ + OH^- + H_2O$   
 (3)  $MO_2 + H_2O \longrightarrow M^+ + OH^- + H_2O_2 + O_2$   
 (4)  $MO_2 + H_2O \longrightarrow M^+ + OH^-$

135. Milk of magnesia is:

(1) Suspension of  $Mg(OH)_2$  in water  
 (2) Colloid of  $Mg(OH)_2$  in water  
 (3) True solution of  $Mg(OH)_2$  in water  
 (4) Pure  $Mg(OH)_2$

136. The tendency to form halide hydrates in group 2 elements?

(1) increases down the group  
 (2) decreases down the group  
 (3) remains constant  
 (4) first decreases then increases down the group

137. For slowing down the process of setting of Cement so that it gets sufficiently hard, the compound added is:

(1) Limestone (2) dicalcium silicate  
 (3) Gypsum (4) Tricalcium aluminate

138. Which of the following alkali metal doesn't form ethynide on reaction with ethyne?

(1) Li (2) Na (3) K (4) Rb

139. Which of the following compound is thermally most stable?

(1)  $LiNO_3$  (2)  $NaNO_3$  (3)  $KNO_3$  (4)  $RbNO_3$

140. What is the order of relative degree of hydration

(1)  $Cs^+(aq) > Rb^+(aq) > K^+(aq) > Na^+(aq) > Li^+(aq)$   
 (2)  $Li^+(aq) > Na^+(aq) > K^+(aq) > Rb^+(aq) > Cs^+(aq)$   
 (3)  $Na^+(aq) > K^+(aq) > Rb^+(aq) > Cs^+(aq) > Li^+(aq)$   
 (4)  $Cs^+(aq) > Na^+(aq) > Rb^+(aq) > Li^+(aq) > K^+(aq)$

141. Least mobile ion is

(1)  $[Be(H_2O)_6]^{+2}$  (2)  $[Na(H_2O)_6]^+$   
 (3)  $[Mg(H_2O)_6]^{+2}$  (4)  $[Li(H_2O)_6]^+$

142. Which is more soluble in water

(1)  $CaF_2$  (2)  $BaF_2$   
 (3)  $SrF_2$  (4)  $BeF_2$

143. A solid compound X on heating gives  $CO_2$  gas and residue when mixed with water it forms Y on passing on excess of  $CO_2$  through Y in water a clear solution of Z is obtained. On boiling Z compound X is reformed compound X is

(1)  $CaCO_3$  (2)  $Na_2CO_3$   
 (3)  $K_2CO_3$  (4)  $Ca(HCO_3)_2$

144. An element of s-block forms oxide of 'MO' type which is amphoteric in nature, correct statement regarding element is

(1) Its hydroxide is most soluble in its group hydroxides  
 (2) It forms peroxide  
 (3) Its sulphate is most soluble in its group sulphates  
 (4) Its carbonate is most stable in its group carbonates

145. Correct order is

(1)  $LiH < NaH < CsH \longrightarrow$  ionic character  
 (2)  $F-F < H-H < D-D \longrightarrow$  bond energy  
 (3)  $NH_3 < H_2O < H_2O_2 \longrightarrow$  acidic character  
 (4) all the above

146. Which of the following reacts with water most vigorously  
(1) Na (2) Be (3) Li (4) Mg
147. Consider the following chemical reaction  
 $Z + 3\text{LiAlH}_4 \rightarrow X + 3\text{LiF} + 3\text{AlF}_3$   
 $X + \text{H}_2\text{O} \rightarrow Y + 6\text{H}_2$   
 $3X + \text{O}_2 \xrightarrow{\Delta} \text{B}_2\text{O}_3 + 3\text{H}_2\text{O}$   
 X, Y, Z are respectively  
 (1) B,  $\text{BF}_3$ ,  $\text{H}_3\text{BO}_3$  (2)  $\text{B}_2\text{H}_6$ ,  $\text{BF}_3$ ,  $\text{H}_3\text{BO}_3$   
 (3)  $\text{B}_2\text{H}_6$ ,  $\text{H}_3\text{BO}_3$ ,  $\text{BF}_3$  (4)  $\text{Na}_2\text{B}_4\text{O}_7$ ,  $\text{B}_2\text{H}_6$

### HYDROGEN

148. The hydride ion  $\text{H}^-$  is a stronger base than hydroxide ion which of the following reaction will occur if NaH is dissolved in water.  
 (1)  $\text{H}_{\text{aq}}^- + \text{H}_2\text{O}_{(l)} \rightarrow \text{H}_3\text{O}_{\text{aq}}^+$   
 (2)  $\text{H}_{\text{aq}}^- + \text{H}_2\text{O}_{(l)} \rightarrow \text{OH}_{\text{aq}}^- + \text{H}_{2(g)}$   
 (3)  $\text{H}_{\text{aq}}^- + \text{H}_2\text{O}_{(l)} \rightarrow$  no reaction  
 (4) None of these
149. Hydrogen peroxide is reduced by  
 (1) Ozone  
 (2) Barium peroxide  
 (3) Acidic solution of  $\text{KMnO}_4$   
 (4) Lead Sulphide
150. Water softening by Clarke's process uses  
 (1) Calcium bicarbonate  
 (2) Sodium bicarbonate  
 (3) Potash alum  
 (4) Calcium Hydroxide

151. Which of the following isotope of hydrogen is radioactive?  
 (1)  ${}^1_1\text{H}^1$  (2)  ${}^1_1\text{H}^2$  (3)  ${}^1_1\text{H}^3$  (4) Both 2 & 3
152. Which reaction is not used in the preparation of  $\text{H}_2$ ?  
 (1)  $\text{Zn} + \text{NaOH} \rightarrow$  (2)  $\text{Mg} + \text{NaOH} \rightarrow$   
 (3)  $\text{Al} + \text{NaOH} \rightarrow$  (4)  $\text{Be} + \text{NaOH} \rightarrow$
153. Which of the following is water gas shift reaction?  
 (1)  $\text{CO} + \text{H}_2\text{O} \rightarrow \text{CO}_2 + \text{H}_2$   
 (2)  $\text{C} + \text{H}_2\text{O} \rightarrow \text{CO}$   
 (3)  $\text{CO} + \text{O}_2 \rightarrow \text{CO}_2$   
 (4)  $\text{CO} + \text{H}_2 \rightarrow \text{CH}_3\text{OH}$

154. Which cannot be oxidised by  $\text{H}_2\text{O}_2$ ?  
 (1)  $\text{Na}_2\text{SO}_3$  (2)  $\text{PbS}$   
 (3)  $\text{KI}$  (4)  $\text{O}_3$

155. Which of the following reaction represents the oxidising property of  $\text{H}_2\text{O}_2$ ?  
 (1)  $\text{KMnO}_4 + \text{H}_2\text{SO}_4 + \text{H}_2\text{O}_2 \rightarrow \text{K}_2\text{SO}_4 + \text{MnSO}_4 + \text{H}_2\text{O} + \text{O}_2$   
 (2)  $\text{K}_3[\text{Fe}(\text{CN})_6] + \text{KOH} + \text{H}_2\text{O}_2 \rightarrow \text{K}_4[\text{Fe}(\text{CN})_6] + \text{H}_2\text{O} + \text{O}_2$   
 (3)  $\text{PbO}_2 + \text{H}_2\text{O}_2 \rightarrow \text{PbO} + \text{H}_2\text{O} + \text{O}_2$   
 (4) None of these

156. Permanent hardness can be removed by adding  
 (1)  $\text{Cl}_2$  (2)  $\text{Na}_2\text{CO}_3$   
 (3)  $\text{CaOCl}_2$  (4)  $\text{K}_2\text{CO}_3$
157. Calgon used as water softner is?  
 (1)  $\text{Na}_6\text{P}_6\text{O}_{18}$  (2)  $\text{Na}_4\text{P}_6\text{O}_{18}$   
 (3)  $\text{Na}_6\text{P}_4\text{O}_{18}$  (4)  $\text{Na}_6\text{P}_5\text{O}_{10}$
158. Which is not present in clear hard water  
 (1)  $\text{Mg}(\text{HCO}_3)_2$  (2)  $\text{CaCl}_2$   
 (3)  $\text{MgSO}_4$  (4)  $\text{MgCO}_3$
159. Which is formed when calcium carbide reacts with heavy water  
 (1)  $\text{C}_2\text{D}_2$  (2)  $\text{CaD}_2$  (3)  $\text{Ca}_2\text{D}_2\text{O}$  (4)  $\text{CD}_2$

### COORDINATION COMPOUND

160. The correct IUPAC name of  $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$  is  
 (1) Diamminedichloridoplatinum (II)  
 (2) Diamminedichloridoplatinum (IV)  
 (3) Diamminedichloridoplatinum (0)  
 (4) Diamminedichloridoplatinum (IV)
161. When  $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$  is treated with excess of  $\text{AgNO}_3$ , 3 Mol of  $\text{AgCl}$  are obtained. The formula of the complex is:  
 (1)  $[\text{CrCl}_3(\text{H}_2\text{O})_3] \cdot 3\text{H}_2\text{O}$   
 (2)  $[\text{CrCl}_2(\text{H}_2\text{O})_4]\text{Cl} \cdot 2\text{H}_2\text{O}$   
 (3)  $[\text{CrCl}(\text{H}_2\text{O})_5]\text{Cl}_2 \cdot \text{H}_2\text{O}$   
 (4)  $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$
162. Indicate the complex ion which shows geometrical isomerism.  
 (1)  $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]^+$  (2)  $[\text{Pt}(\text{NH}_3)_3\text{Cl}]$   
 (3)  $[\text{Co}(\text{NH}_3)_6]^{3+}$  (4)  $[\text{Co}(\text{CN})_5(\text{NC})]^{-3}$
163. Which of the following options correct for  $\text{K}_4[\text{Fe}(\text{CN})_6]$  complex?  
 (1)  $d^2sp^3$  Hybridisation, diamagnetic  
 (2)  $sp^3d^2$  Hybridisation  
 (3) Paramagnetic  
 (4) None of these



184. When excess of ammonia is added to  $\text{CuSO}_4$  solution. The deep blue colour complex is formed. The complex is  
(1) Tetrahedral & paramagnetic  
(2) tetrahedral & diamagnetic  
(3) square planar & diamagnetic  
(4) square planar & paramagnetic
185. IUPAC name of  $[\text{Pt}(\text{NH}_3)_2\text{Cl}(\text{NO}_2)]$  is  
(1) platinum diamminechloronitrite  
(2) chloronitrito-N-ammineplatinum(II)  
(3) Diammine chloridonitrito-N-Platinum(II)  
(4) diamminechloronitrito-N-Platinum(II)
186. Which of the following have maximum number of isomers  
(1)  $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$  (2)  $[\text{Ni}(\text{en})(\text{NH}_3)_4]^+$   
(3)  $[\text{Ni}(\text{C}_2\text{O}_4)(\text{en})_2]^0$  (4)  $[\text{Cr}(\text{SCN})_2(\text{NH}_3)_4]^+$
187. Which among the following can exhibit cis-trans isomerism  
(1)  $\text{CoCl}_3 \cdot 4\text{NH}_3$  (2)  $\text{CoCl}_3 \cdot 6\text{NH}_3$   
(3)  $\text{CoCl}_3 \cdot 5\text{NH}_3$  (4) All of these
188. Out of the following coordination entities which is chiral (optically active)  
(1)  $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$   
(2)  $\text{trans}[\text{CrCl}_2(\text{OX})_2]^{3-}$   
(3)  $\text{cis}[\text{CrCl}_2(\text{NH}_3)_4]^+$   
(4)  $\text{cis}[\text{CrCl}_2(\text{OX})_2]^{3-}$
189. Amongst the following the most stable compound is  
(1)  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$  (2)  $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$   
(3)  $[\text{Fe}(\text{NH}_3)_6]^{3+}$  (4)  $[\text{FeCl}_6]^{3-}$
190. Which of the following is an organometallic compound  
(1) cis-platin (2) Zeise salt  
(3) Tollen's reagent (4) Sodium nitroprusside
191. Which of the following system has maximum value of  $\mu$  (only spin magnetic moment)?  
(1)  $d^5$  ( $\Delta_0 > P$ ) (2)  $d^8$  (tetrahedral)  
(3)  $d^6$  (high spin) (4)  $d^9$  (octahedral)
192. The IUPAC name for  $[\text{Pt}(\text{NH}_3)_3(\text{Br})(\text{NO}_2)\text{Cl}]\text{Cl}$  is  
(1) Triamminechlorobromonitro platinum(IV) chloride  
(2) Triamminebromochloronitro platinum(IV) chloride  
(3) Trimminechlorobromo platinum(IV) chloride  
(4) Triamminechloronitrobromoplatinum(IV) chloride
193. Which of the following cannot act as electrolyte  
(1)  $\text{CoCl}_3 \cdot 6\text{NH}_3$  (2)  $\text{CoCl}_3 \cdot 5\text{NH}_3$   
(3)  $\text{CoCl}_3 \cdot 4\text{NH}_3$  (4)  $\text{CoCl}_3 \cdot 3\text{NH}_3$
194. In brown ring complex, the oxidation state of iron will be  
(1) +2 (2) +3 (3) +1 (4) 0
195. Hexafluoroferrate(III) ion is an outer orbital complex the number of unpaired electrons present in it is  
(1) 1 (2) 5 (3) 4 (4) unpredictable
196. Which of the following does not have optical isomer  
(1)  $[\text{Co}(\text{en})_3]\text{Cl}_3$  (2)  $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$   
(3)  $[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$  (4)  $[\text{Co}(\text{en})(\text{NH}_3)_2\text{Cl}_2]\text{Cl}$
197. Among the following ions, which one has highest paramagnetism  
(1)  $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$  (2)  $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$   
(3)  $[\text{Zn}(\text{H}_2\text{O})_6]^{2+}$  (4)  $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$
198. The geometry of  $[\text{Ni}(\text{CO})_4]$  and  $[\text{Ni}(\text{PPh}_3)_2\text{Cl}_2]$  are  
(1) both are square planar  
(2) tetrahedral and square planar  
(3) both tetrahedral  
(4) square planar and tetrahedral
199. Geometrical isomerism can be shown by  
(1)  $[\text{Ag}(\text{CN})(\text{NH}_3)]$   
(2)  $\text{Na}_2[\text{Cd}(\text{NO}_2)_4]$   
(3)  $[\text{PtCl}_4]^{2-}$   
(4)  $[\text{PtCl}(\text{NH}_3)_3][\text{Au}(\text{CN})_4]$
200. Which of the following will give a pair of enantiomorphs  
(1)  $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$   
(2)  $[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$   
(3)  $[\text{Pt}(\text{NH}_3)_4][\text{PtCl}_6]$   
(4)  $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{NO}_2$
201. Which of the metals has most stable carbonate  
(1) Na (2) Mg (3) Al (4) Si
202. Spin only magnetic moments of a  $d^9$  ion in octahedral, square planar and tetrahedral complex, respectively are  
(1) 2.8 BM, 0.4 B.M., 2.8 BM  
(2) 2.8 BM, 0 BM, 2.8 BM  
(3) 0, 0 & 0 B.M.  
(4) None of these

203. Among the following the colored compound is  
 (1)  $\text{CuCl}$  (2)  $\text{K}_3[\text{Cu}(\text{CN})_4]$   
 (3)  $\text{CuF}_2$  (4)  $[\text{Cu}(\text{CH}_3\text{-CN})_4]\text{BF}_4$
204.  $[\text{NiCl}_4]^{2-}$  and  $[\text{Ni}(\text{CN})_4]^{2-}$  resemble in  
 (1) geometry (2) magnetic nature  
 (3) hybridization (4) oxidation state
205. CFSE of high spin  $d^4$  complex is  
 (1)  $-0.6 \Delta_0$  (2)  $-1.8 \Delta_0$   
 (3)  $-1.6 \Delta_0 + P$  (4)  $-1.2 \Delta_0$
206. Total number of possible isomers of complex  $[\text{Pd}(\text{NH}_3)_2(\text{SCN})_2]$   
 (1) 2 (2) 4 (3) 3 (4) 6
207. When  $\text{CuSO}_4$  reacts with excess of  $\text{KCN}$  it forms a soluble complex which is  
 (1)  $\text{K}_2[\text{Cu}(\text{CN})_4]$  (2)  $\text{K}_3[\text{Cu}(\text{CN})_4]$   
 (3)  $\text{Cu}(\text{CN})_2$  (4)  $\text{CuCN}$
208. The IUPAC name for ionisation isomers of  $[\text{Pt}(\text{NH}_3)_3(\text{Br})(\text{NO}_2)(\text{I})]\text{Cl}$  is  
 (1) Triamminebromidochloridonitro platinum (IV) iodide  
 (2) Triamminebromidochloridoiodido platinum(IV) nitrite  
 (3) Triamminechloridoiodidonitro platinum (IV) bromide  
 (4) All are possible
209. Which ion would you expect to have the maximum splitting of d-orbitals  
 (1)  $[\text{Fe}(\text{CN})_6]^{4-}$  (2)  $[\text{Fe}(\text{CN})_6]^{3-}$   
 (3)  $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$  (4)  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$
210. Indicate the complex ion which shows geometrical isomerism  
 (1)  $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]^+$  (2)  $[\text{Pt}(\text{NH}_3)_3\text{Cl}]^+$   
 (3)  $[\text{Co}(\text{NH}_3)_6]^{3+}$  (4)  $[\text{Co}(\text{CN})_5(\text{NC})]^{3-}$
211. When 1 mole of  $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$  is treated with excess of  $\text{AgNO}_3$ , 3 mole of  $\text{AgCl}$  are obtained. The formula of the complex is  
 (1)  $[\text{CrCl}_3(\text{H}_2\text{O})_3] \cdot 3\text{H}_2\text{O}$   
 (2)  $[\text{CrCl}_3(\text{H}_2\text{O})_4]\text{Cl} \cdot 2\text{H}_2\text{O}$   
 (3)  $[\text{CrCl}_3(\text{H}_2\text{O})_5]\text{Cl}_2 \cdot 3\text{H}_2\text{O}$   
 (4)  $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$
212. A brown ring is formed in the ring test of  $\text{NO}_3^-$  ion. It is due to the formation of  
 (1)  $[\text{Fe}(\text{H}_2\text{O})_5(\text{NO})]^{2+}$  (2)  $\text{FeSO}_4 \cdot \text{NO}_2$   
 (3)  $[\text{Fe}(\text{H}_2\text{O})_4(\text{NO})_2]^{2+}$  (4)  $\text{FeSO}_4 \cdot \text{HNO}_3$
213. The correct formula of diammine dichlorodicyano chromate(III) is :-  
 (1)  $[\text{CrCl}_2(\text{CN})_2(\text{NH}_3)_2]^{3+}$   
 (2)  $[\text{CrCl}_2(\text{CN})_2(\text{NH}_3)_2]^{3-}$   
 (3)  $[\text{CrCl}_2(\text{CN})_2(\text{NH}_3)_2]$   
 (4)  $[\text{CrCl}_2(\text{CN})_2(\text{NH}_3)_2]^-$
- P-BLOCK ELEMENTS**
214. How many bridging oxygen atoms are present in  $\text{P}_4\text{O}_{10}$ ?  
 (1) 6 (2) 4 (3) 2 (4) 5
215. Which of the following phosphorus is the most reactive?  
 (1) Scarlet phosphorus (2) White phosphorus  
 (3) Red phosphorus (4) Violet phosphorus
216. Which of the following can be hydrolysed?  
 (1)  $\text{TeF}_6$  (2)  $\text{NCl}_3$   
 (3)  $\text{SF}_6$  (4) Both 1 & 2
217. Correct order of acid strength is -  
 (1)  $\text{HClO}_4 < \text{HClO}_3 < \text{HClO}_2 < \text{HClO}$   
 (2)  $\text{HClO} < \text{HClO}_2 < \text{HClO}_3 < \text{HClO}_4$   
 (3)  $\text{HClO}_4 < \text{HClO} < \text{HClO}_2 < \text{HClO}_3$   
 (4)  $\text{HClO}_2 < \text{HClO}_3 < \text{HClO}_4 < \text{HClO}$
218. Which of the following is a sesquioxide?  
 (1)  $\text{N}_2\text{O}_4$  (2)  $\text{N}_2\text{O}_3$  (3)  $\text{N}_2\text{O}$  (4)  $\text{N}_2\text{O}_5$
219. Which of the following does not form during hydrolysis of  $\text{XeF}_6$ ?  
 (1)  $\text{XeO}_3$  (2)  $\text{XeOF}_4$  (3)  $\text{XeO}_2\text{F}_2$  (4)  $\text{XeOF}_3$
220. Mixture used in Holme's signal is?  
 (1)  $\text{CaC}_2$  and  $\text{CaCl}_2$  (2)  $\text{CaCl}_2$  and  $\text{Ca}_3\text{P}_2$   
 (3)  $\text{CaC}_2$  and  $\text{Ca}_3\text{N}_2$  (4)  $\text{CaC}_2$  and  $\text{Ca}_3\text{P}_2$
221.  $\text{HNO}_2$  act as an/a  
 (1) acid (2) oxidising agent  
 (3) reducing agent (4) All
222. The nitrogen oxide that do not contain N-N bond are-  
 (1)  $\text{N}_2\text{O}$  (2)  $\text{N}_2\text{O}_3$  (3)  $\text{N}_2\text{O}_4$  (4)  $\text{N}_2\text{O}_5$
223. Bleaching action of  $\text{SO}_2$  is due to-  
 (1) reduction (2) oxidation  
 (3) hydrolysis (4) acidic nature
224.  $\text{PH}_3$  can be formed in  
 (1) hydrolysis of calcium phosphide  
 (2) heating  $\text{H}_3\text{PO}_3$   
 (3) reaction of  $\text{P}_4$  &  $\text{NaOH}$  in inert atmosphere  
 (4) All

225. A (black compound)  $\xrightarrow{\text{halogen acid}}$  B (green yellow gas)  
 $B(\text{excess}) \xrightarrow{NH_3}$  C (unstable trihalide)  
 Correct statement is  
 (1) C is  $PCl_3$  (2) halogen acid is HI  
 (3) B is  $Cl_2$  (4) A is  $KMnO_4$
226. Beryl is a type of  
 (1) chain silicate (2) cyclic silicate  
 (3) sheet silicate (4) 3-D silicate
227. Order of  $pK_a$   
 (1)  $HOCl > HClO_2 > HClO_3 > HClO_4$   
 (2)  $HClO_4 > HClO_3 > HClO_2 > HOCl$   
 (3)  $HOCl > HClO_3 > HClO_4 > HClO_2$   
 (4)  $HClO_3 > HClO_2 > HOCl > HClO_4$
228. Which of the following compound will not give  $NH_3$  on heating  
 (1)  $(NH_4)_2SO_4$  (2)  $(NH_4)_2CO_3$   
 (3)  $NH_4NO_2$  (4)  $NH_4Cl$
229. On hydrolysis  $CaC_2$  gives a gas which on trimerisation gives  
 (1)  $C_2H_2$  (2)  $C_6H_6$   
 (3)  $C_2H_4$  (4)  $C_3H_8$
230.  $P + Cl_2 \rightarrow A$ ,  $P + \text{Excess } Cl_2 \rightarrow B$   
 Hydrolysis products of A and B are respectively  
 (1)  $H_3PO_2$ ,  $H_3PO_3$  (2)  $H_3PO_4$ ,  $H_3PO_3$   
 (3)  $H_3PO_3$ ,  $H_3PO_4$  (4)  $H_3PO_2$ ,  $H_3PO_4$
231. Which among the following order of given properties is incorrect  
 (1)  $HOCl > HClO_2 > HClO_3 > HClO_4$  - oxidising nature  
 (2)  $Cl > F > Br > I$  - electron affinity  
 (3)  $Cl_2 > Br_2 > I_2 > F_2$  - bond dissociation energy  
 (4)  $HF < HCl < HBr < HI$  - acidic nature
232. Amongst the following the central atoms are directly bonded in  
 (1)  $N_2O_5$  (2)  $S_2O_5^{2-}$   
 (3)  $P_4O_{10}$  (4)  $Mn_2O_7$
233. The chain length of silicones can be controlled by  
 (1)  $(CH_3)_3SiCl$   
 (2) Addition of Cu powder  
 (3) Elevation of temperature  
 (4) None of these
234. Which of the following statement is incorrect regarding  $B_2H_6$ ?  
 (1) On methylation it gives  $B_2H(CH_3)_5$   
 (2) It has two  $2e-3C$  bonds  
 (3) It has one  $4e-4C$  bond  
 (4) It has four  $2e-2C$  bonds
235. Red and white phosphorus are similar in  
 (1) smell (2) solubility in  $CS_2$   
 (3) Hybridisation of P (4) Stability
236. Which of the following is strongest oxidizing agent  
 (1)  $HOCl$  (2)  $HClO_2$  (3)  $HClO_3$  (4)  $HClO_4$
237. In which species O-O bond is present  
 (1)  $S_2O_8^{2-}$  (2)  $S_4O_6^{2-}$  (3)  $SO_3^{2-}$  (4)  $S_2O_7^{2-}$
238. Glass is soluble in  
 (1) aqua regia (2)  $H_2SO_4$   
 (3) HF (4)  $HClO_4$
239. Paramagnetic oxide is  
 (1) NO (2)  $N_2O_4$   
 (3)  $P_4O_6$  (4)  $N_2O_5$
240. Which oxide does not act as a reducing agent  
 (1) NO (2)  $NO_2$   
 (3)  $N_2O$  (4)  $N_2O_5$
241. Borax bead test is not given by  
 (1) An aluminium salt (2) A cobalt salt  
 (3) A copper salt (4) A nickel salt
242. The reaction showing endothermic nature and reduction of halogen is  
 (1)  $F_2 + \frac{1}{2}O_2 \rightarrow F_2O$   
 (2)  $Cl_2 + O_2 \rightarrow Cl_2O$   
 (3)  $F_2 + H_2O \rightarrow 2HF + \frac{1}{2}O_2$   
 (4) None of the above
243. In which of the following oxy acid of sulphur sulphur atoms has different oxidation states  
 (1)  $H_2S_4O_6$  (2)  $H_2S_2O_8$  (3)  $H_2S_2O_4$  (4) All
244. Which of the following is most acidic?  
 (1)  $Cl_2O_7$  (2)  $SO_3$  (3)  $P_2O_5$  (4)  $SiO_2$
245. Which of the following is not peroxide  
 (1)  $Na_2O_2$  (2)  $CaO_2$   
 (3)  $PbO_2$  (4)  $H_2O_2$
246. In which of the reaction phosphine is not obtained as product  
 (1)  $Ca_3P_2 + HCl \rightarrow$  (2)  $P_4 + NaOH \rightarrow$   
 (3)  $H_3PO_4 \xrightarrow{\Delta}$  (4)  $H_3PO_3 \xrightarrow{\Delta}$



269. Which Products are formed (Respectively) by Reaction of Lanthanoids with Hydrogen oxide, burns in  $O_2$  and Heated with Sulphur  
 (1)  $Ln(OH)_3$ ,  $Ln_2O_3$ ,  $Ln_2S_3$   
 (2)  $Ln \cdot xH_2O$ ,  $Ln \cdot O_2$  & Heterocyclic Sulphides  
 (3)  $Ln_2O_3$ ,  $Ln(OH)_3$  &  $LnS$   
 (4) Macrocyclic ligands containing  $OH^-$  ions,  $LnO$  & Homo cyclic sulphides
270. Catalyst Related to Polymerisation of Monomers having Two carbon atoms having one double bond  
 (1)  $V_2O_5$  + Asbestos +  $TiCl_4$   
 (2) Zeolite + Feldspar  
 (3)  $TiCl_4$  + Tri Methyl Aluminium  
 (4)  $MnO_2$  +  $KMnO_4$  +  $PdCl_2$
271. Elements of 4f series can form with Carbon-  
 (1)  $Ln_3C$  &  $LnC_2$  (2)  $Ln_2C_3$  &  $LnC_3$   
 (3)  $LnC_3$  &  $Ln_3C$  (4) All of the above
272. Most of the Metals in Mischmetal are Related to -  
 (1) Metals of d-block  
 (2) Lanthanoids  
 (3) Actinoids  
 (4) Actinoids & d-block metals both
273. What is incorrect about the reactions of  $KMnO_4$  and oxalic acid  
 (1)  $CO_2$  is formed  
 (2) decolourisation is fast in beginning but become slow after some time  
 (3)  $Mn^{2+}$  is autocatalyst  
 (4) It is a redox change
274. Which statement is correct  
 (1) Most common oxidation state of lanthanoid is +2  
 (2)  $HCl$  can be used to acidify  $KMnO_4$  during redox reaction  
 (3) In presence of  $CO_2$ , orange dichromate solution changes to yellow chromate  
 (4) To separate  $Fe_2O_3$  and  $Al_2O_3$ ,  $NaOH$  can be used
275. On addition of small amount of  $KMnO_4$  to concentrated  $H_2SO_4$ , a green oily compound is obtained which is highly explosive in nature the compound is  
 (1)  $Mn_2O_7$  (2)  $MnO_2$  (3)  $MnSO_4$  (4)  $Mn_2O_3$
276.  $CrO_4^{2-} \xrightleftharpoons[pH=Y]{pH=X} Cr_2O_7^{2-}$   
 The pH values of (X) and (Y) are respectively  
 (1) 4 and 5 (2) 4 and 8  
 (3) 8 and 4 (4) 8 and 9
277. Which of the following is the strongest oxidizing agent  
 (1)  $Mn^{2+}$  (2)  $Zn^{2+}$  (3)  $Ni^{2+}$  (4)  $Cu^{2+}$
278. Spegeleisen is an alloy of  
 (1) Fe and Mn (2) Fe, Mn & C  
 (3) Fe, Mn & Cr (4) Fe and Cr
279. The product of oxidation of  $I^-$  with  $MnO_4^-$  in alkaline medium is  
 (1)  $IO_3^-$  (2)  $I_2$  (3)  $IO^-$  (4)  $IO_4^-$
280. The transition element of 3d series which does not show variable oxidation state  
 (1) Zn (2) Cu (3) Cr (4) Cd
- METALLURGY**
281. In which of the following metallurgy, self reduction is not possible  
 (1)  $ZnS \rightarrow Zn$  (2)  $PbS \rightarrow Pb$   
 (3)  $Cu_2S \rightarrow Cu$  (4)  $HgS \rightarrow Hg$
282. Which reaction(s) occurs during calcination  
 (a)  $CaCO_3 \longrightarrow CaO + CO_2$   
 (b)  $2FeS_2 + \frac{11}{2}O_2 \longrightarrow Fe_2O_3 + 4SO_2$   
 (c)  $Al_2O_3 \cdot xH_2O \longrightarrow Al_2O_3 + xH_2O$   
 (d)  $ZnS + \frac{3}{2}O_2 \longrightarrow ZnO + SO_2$   
 correct option are  
 (1) a and b (2) b and c  
 (3) a and c (4) b and d
283. Copper matte contains  
 (1)  $Cu_2S$  +  $FeS$  (2)  $Cu_2O$  +  $FeO$   
 (3)  $Cu_2S$  +  $ZnS$  (4)  $Cu_2S$  +  $HgS$
284. During the extraction of Ag and Au using a KCN solution and Zn, cyanide ions and Zn react with metal ion as respectively  
 (1) a reducing Agent, an oxidising Agent  
 (2) a complexing Agent, a reducing Agent  
 (3) an oxidising Agent, a complexing Agent  
 (4) a reducing Agent, a complexing Agent
285. Match the column  

Column-I	Column-II
(a) Zone Refining	(P) Ge, Si, Ga
(b) Mond Process	(Q) Cu
(c) Van arkel Method	(R) Zr, Ti
(d) Electrolytic refining	(S) Ni
(1) (a) P (b) S (c) R (d) Q	
(2) (a) S (b) Q (c) P (d) R	
(3) (a) R (b) Q (c) P (d) S	
(4) (a) Q (b) R (c) P (d) S	

286. Match the column-

Column - I

(a) Copper pyrites

(b) Malachite

(c) Calamine

(d) Sphalerite

(1) (a) Q (b) R

(2) (a) R (b) Q

(3) (a) P (b) Q

(4) (a) S (b) P

Column - II

(P)  $\text{ZnCO}_3$ (Q)  $\text{CuCO}_3 \cdot \text{Cu(OH)}_2$ (R)  $\text{CuFeS}_2$ (S)  $\text{ZnS}$ 

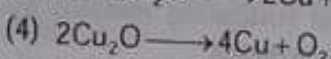
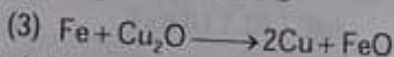
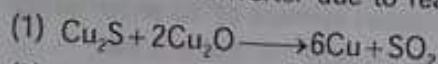
(c) S (d) P

(c) P (d) S

(c) R (d) S

(c) R (d) Q

287. In the extraction of copper metal is formed in the bassemmer converter due to reaction.

288. Sheelite ( $\text{CaWO}_4$ ) is an ore of tungsten which contain tungstate ion, Tungstate ion is also present in

(1) Limonite

(2) Dolomite

(3) Wolframite

(4) Siderite

289. Which of the following pair is Incorrectly matched

(1) Kroll's Process - Titanium

(2) Froth floatation - Cerussite

(3) distillation - Zinc

(4) dipressants -  $\text{NaCN}$ 

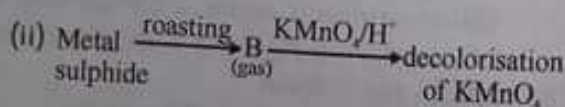
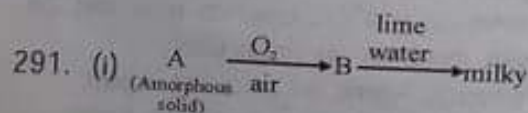
290. Which of the following metals cannot be extracted by carbon reduction process?

(1) Pb

(2) Al

(3) Hg

(4) Zn



Correct statement is

(1) A is  $\text{FeO}$ (2) B is  $\text{CO}_2$ (3) B is  $\text{SO}_2$ (4) A is  $\text{ZnS}$ 

292. Correct match is

Purification by

Method

(1) Zr

Polling

(2) Zn

Van arkel

(3) Ni

distillation

(4) Ge

Zone refining

293. Extraction of silver from argentiferous lead is done by

(1) Parkes process

(2) Serpeck process

(3) Down's process

(4) Castner-Kellener process

294. Thermite is a mixture of

(1)  $\text{Zn} + \text{Mg}$ (2)  $\text{Fe} + \text{Al}$ (3)  $\text{Fe}_2\text{O}_3 + \text{Al}$ (4)  $\text{Cu} + \text{Mg}$ 

295. Sulphide ore is

(1) copper pyrites

(2) malachite

(3) haematite

(4) magnesite

296. Which of the following term is not related to Al extraction

(1) Serpeck's process

(2) Hall - Heroult process

(3) Thermite process

(4) Hoop's process

297. Which of the following metal is leached by cyanide process

(1) Ag

(2) Na

(3) Al

(4) Cu

298. Which of the following is concentrated by froth-floatation method?

(1) cassiterite

(2) magnetite

(3) melachite

(4) galena

299. List-I

(a) cyanide process

List-II

(b) Froth floatation process

(P) Ultra pure 'Ge'

(c) electrolytic reduction

(Q) Pine oil

(d) Zone refining

(R) extraction of Al

(S) extraction of Au

a

b

c

d

(1) R

P

S

Q

(2) S

Q

R

P

(3) R

Q

S

P

(4) S

P

R

Q

300. In extraction of copper from its sulphide ore, the metal is formed by the reduction of  $\text{Cu}_2\text{O}$  with(1)  $\text{FeS}$ (2)  $\text{CO}$ (3)  $\text{Cu}_2\text{S}$ (4)  $\text{SO}_2$

# INORGANIC CHEMISTRY

## ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	2	1	4	3	1	1	2	2	3	1	3	2	4	4	4
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	4	1	2	4	3	2	2	1	2	1	2	2	3	2	2
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	4	4	1	3	2	1	2	1	2	3	2	2	2	1	3
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	1	1	1	1	1	3	3	1	2	2	2	1	2	3	2
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	1	1	1	3	2	4	3	1	3	2	3	3	2	2	1
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans.	4	1	4	4	1	3	2	3	4	4	2	3	2	2	3
Que.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Ans.	2	3	3	2	1	3	4	3	3	2	4	3	2	4	1
Que.	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	1	2	4	4	2	2	1	4	2	1	3	4	1	2	3
Que.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
Ans.	3	3	4	4	3	4	2	3	1	1	1	2	2	3	1
Que.	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
Ans.	2	3	1	4	2	1	4	1	3	4	1	3	2	4	4
Que.	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165
Ans.	3	2	1	4	4	2	1	4	1	1	4	1	1	3	4
Que.	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans.	2	4	2	1	2	3	2	3	4	2	4	1	1	2	2
Que.	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195
Ans.	4	3	4	4	3	4	1	4	2	2	3	2	4	3	2
Que.	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210
Ans.	2	2	3	3	2	1	2	3	4	1	4	2	4	2	1
Que.	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
Ans.	4	1	4	1	2	4	2	2	4	4	4	4	1	4	3
Que.	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
Ans.	2	1	3	2	3	3	2	1	1,3	3	1	1	3	1	4
Que.	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
Ans.	1	2	1	1	3	3	3	1	4	1	3	4	2	3	1
Que.	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
Ans.	4	2	4	4	1	1	2	1	1	1	3	4	3	1	3
Que.	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285
Ans.	1	2	2	4	1	2	4	2	1	1	1	3	1	2	1
Que.	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Ans.	2	1	3	2	2	3	4	1	3	1	3	1	4	2	3

**INORGANIC CHEMISTRY****SOLUTIONS**

4.	Na	Mg	Si	Al?
I.E.	496	737	786	(KJ/mol)

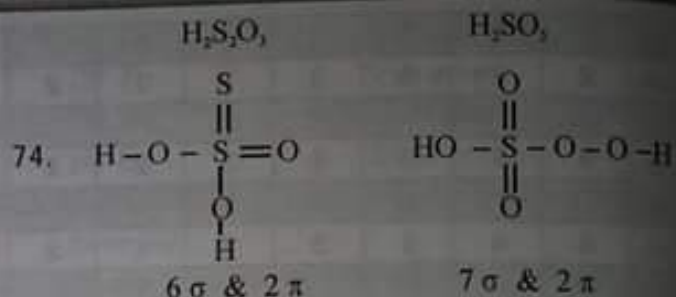
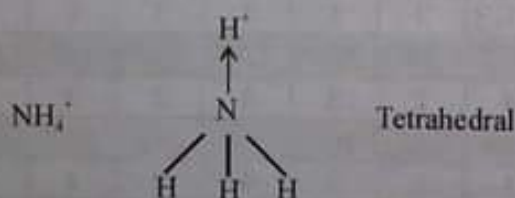
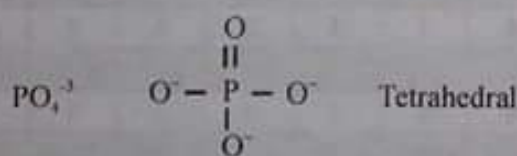
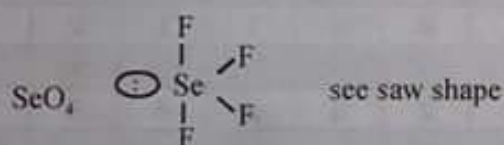
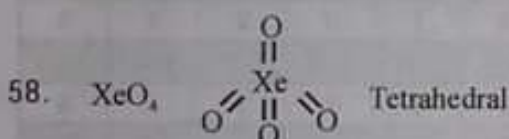
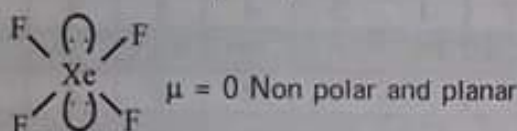
I. E. order  $\rightarrow$   $\text{Na} < \text{Al} < \text{Mg} < \text{Si}$   
 due to Penetration  
 $\therefore 496 < \text{Al} < 737 < 786$   
 $\therefore \text{Al} = 575 \text{ KJ/mol}$

14. Radius order

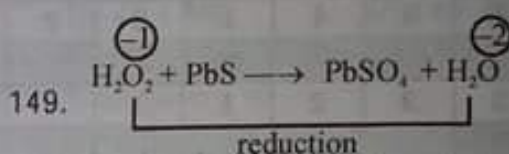
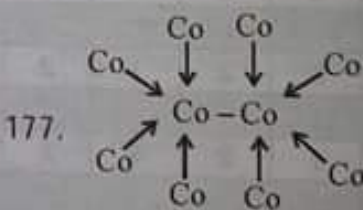
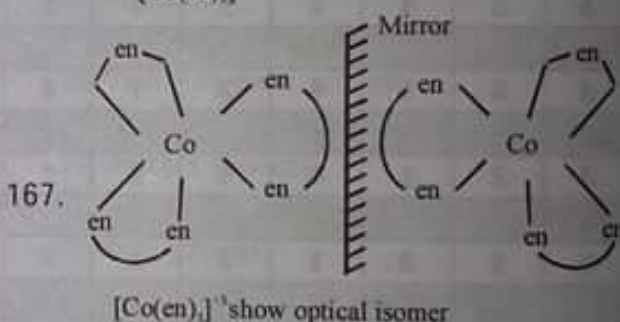
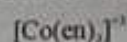
$\text{B} < \text{Al} = \text{Ga} < \text{In} = \text{Tl}$   
 due to Transition Contraction      due to Lanthanide Contraction

20.  $\text{Cr} = 4s^1 3d^5$ no. of U.P.  $e^- = 6$ 

48.  $\text{XeF}_4 = 4\sigma + 2\ell p$   
 $=$  square planar

81. For  $\text{O}_2$  molecule the last  $2e^-$  enter in A.B.M.O.  $\pi^* 2p^1_x = \pi^* 2p^1_y$ 

$$\text{B.O.} = \frac{1}{2} [N_b - N_a]$$

152. Zn, Al & Be are amphoteric, hence react with NaOH to release  $\text{H}_2$  whereas Mg does not.

$$\text{Co} = Z \rightarrow 27$$

Number of co-ordinate bond  $\rightarrow 4$ Number of delta bond  $\rightarrow 1$ So value of 'n' in  $(\text{Co})_n - \text{Co} - \text{Co} - (\text{Co})_n = 4$ 283. Copper matte containing  $\text{Cu}_2\text{S} + \text{FeS}$ 

285. Zone Refining - Ge, Si, Ga

Mond Process - Ni

Van arkel Method - Zr, Ti

Electrolytic refining - Cu

287. Extraction of copper in bassemmer converter



289. Kroll's Process - Mg

Froth Floatation - Cerussite

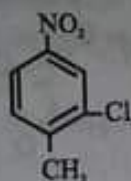
Distillation - Zn

Dipressants - NaCN

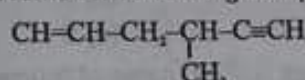
# ORGANIC CHEMISTRY

## NOMENCLATURE

1. IUPAC Name of following compound is:



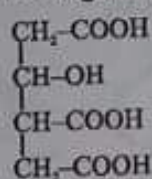
- (1) 4-Methyl-5-Chloro-nitrobenzene  
(2) 2-Chloro-1-methyl-4-nitrobenzene  
(3) 1-Chloro-2-methyl-5-nitrobenzene  
(4) 1-Methyl-2-chloro-4-nitrobenzene
2. IUPAC Name for following compound



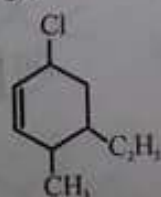
- (1) 4-Methyl hex-1-en-5-yne  
(2) 3-Methyl hex-5-en-1-yne  
(3) 4-Ethynyl Pent-1-ene  
(4) 2-Ethynyl Pent-4-ene
3. IUPAC Name for given comp:-



- (1) 3-Ethyl-4-isopropyl hexa-1-ene  
(2) 3, 4-Diisopropyl hexa-1-ene  
(3) 4-Ethyl-3-isopropyl-5-methyl hex-1-ene  
(4) 3-Ethyl-4-isopropyl-2-methyl hex-5-ene
4. IUPAC Name for given comp.

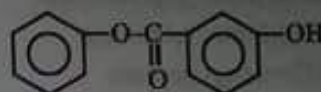


- (1) 3-Hydroxy butane-1, 3, 5-trioic acid  
(2) 3-Hydroxy-4-carboxy hexan-1, 6-dioic acid  
(3) 2-Hydroxy butane-1,3,4-tricarboxylic acid  
(4) 3-Hydroxy butane-1,2,4-tricarboxylic acid
5. IUPAC Name of:



- (1) 3-Chloro-5-Ethyl-5-methyl cyclohex-1-ene  
(2) 2-Chloro-4-Ethyl-5-methyl cyclohexene  
(3) 6-Chloro-4-Ethyl-3-methyl cyclohex-1-ene  
(4) 5-Chloro-3-Ethyl-2-methyl cyclohex-1-ene

6. IUPAC Name of:

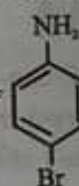


- (1) Phenyl m-hydroxy benzoate  
(2) 3-Phenoxy carbonyl phenol  
(3) Phenyl-3-hydroxy benzoate  
(4) None of these

7. Which of the following is incorrectly matched:

Common name IUPAC name

- (1) Croton aldehyde - But-2-enal  
(2) Cinnemic acid - 3-Phenyl prop-2-enoic acid  
(3) Lactic acid - 2-Hydroxy propanoic acid  
(4) Acrylonitrile - But-2-ene nitrile
8. IUPAC name of  $(\text{CCl}_3)_3\text{CCl}$  is-
- (1) tris - trichloromethyl-1-chloro methane  
(2) 2-Chloro-2-trischloromethyl propane  
(3) 1,1,1,2,3,3,3-Heptachloro-2-trichloromethyl propane  
(4) 1, 1, 1-trichloromethyl-1-chloro methane



9. IUPAC Name of

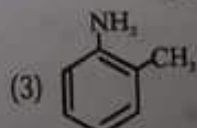
- (1) P-bromoaniline  
(2) 4-Bromobenzenamine  
(3) 4-Bromoaniline  
(4) Both (2) & (3)

10. IUPAC Name of propionphenone:

- (1) Ethyl phenyl methanone  
(2) 1-Phenyl propan-1-one  
(3) 3-Phenyl propanone  
(4) None of these

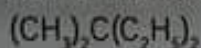
11. Incorrectly matched with their common names

- (1)  $\text{CH}_3-\underset{\text{Br}}{\text{CH}}-\text{CH}_2-\overset{\text{O}}{\underset{\text{||}}{\text{C}}}-\text{H}$   $\beta$ -Bromobutyraldehyde  
(2)  $\text{CH}_3-\text{CH}_2-\underset{\text{CH}_3}{\underset{\text{||}}{\text{CH}}}-\overset{\text{O}}{\underset{\text{||}}{\text{C}}}-\text{OH}$  isovaleric acid



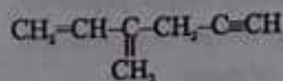
- (3) o-Toluidine  
(4)  $\text{NH}_2-\text{CH}_2-\text{CH}=\text{CH}_2$  Allylamine

12. IUPAC Name for:



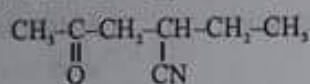
- (1) Diethyl dimethyl methane  
(2) 2-Ethyl-2-methyl butane  
(3) 3,3-Dimethyl pentane  
(4) None of these

13. IUPAC Name of:



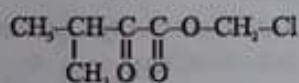
- (1) 2-Propynyl buta-1, 2-diene  
(2) 4-Methylene hex-5-en-1-yne  
(3) 3-Methylene hex-1-en-5-yne  
(4) 2-Vinyl pent-1-en-4-yne

14. IUPAC Name of the given compound



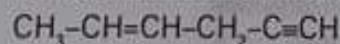
- (1) 4-Cyano hex-2-one  
(2) 2-Ethyl-4-oxo Pentane nitrile  
(3) 2-Oxo-4-cyano hexane  
(4) 2-Oxo- hexane-4-nitrile

15. IUPAC Name for given compound:



- (1) Chloromethyl -2-oxo-3-methyl butanoate  
(2) 1-Chloromethoxy-3-methyl butan-1,2-dione  
(3) 2-Methyl-3-oxo-1-chloromethyl butanoate  
(4) None of these

16. IUPAC name of the following compound is



- (1) Hex-2-en-5-yne (2) Hex-5-yn-2-ene  
(3) Hex-4-en-1-yne (4) Hex-1-yn-4-ene

17. IUPAC name of given compound is

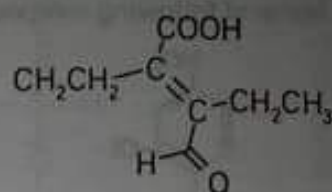


- (1) 1,3-Dimethyl hex-4-ene-1-ol  
(2) 4,6-Dimethyl hex-2-en-6-ol  
(3) 4-Methyl hept-2-en-6-ol  
(4) 4-Methyl hept-5-en-2-ol

18. Which of the following IUPAC name is incorrect

- (1) 3-Bromo-2-chloropentane  
(2) Pent-2-en-4-yne  
(3) 3-Bromo-butan-2-ol  
(4) 1-Aminopentane-2-thiol

19. Number of carbon in parent carbon chain in the following compound

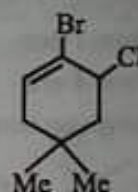


- (1) 4 (2) 5 (3) 6 (4) 3

**ISOMERISM**20. How many cyclic structural isomers of  $\text{C}_5\text{H}_{10}$  are possible.

- (1) 5 (2) 3  
(3) 4 (4) 6

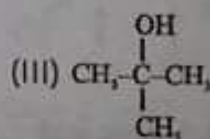
21. The correct IUPAC name of following compound is:



- (1) 2-Bromo-3-chloro-5,5-dimethyl cyclohex-1-ene  
(2) 1-Bromo-6-chloro-4,4-dimethyl cyclohex-1-ene  
(3) 4-Bromo-5-chloro-1,1-dimethyl cyclohex-1-ene  
(4) 1-Bromo-2-chloro-4,4-dimethyl cyclohex-1-ene

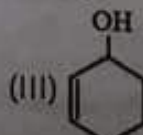
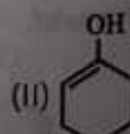
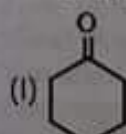
22. Among these chain isomers are:

- (I)  $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{OH}$   
(II)  $\text{CH}_3-\text{CH}_2-\underset{\text{OH}}{\text{CH}}-\text{CH}_3$



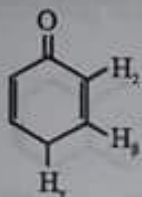
- (1) I only (2) I and III only  
(3) I and II both (4) None of these

23. Tautomer of I is

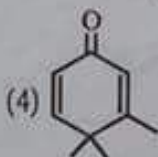
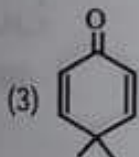
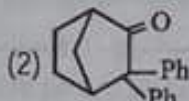
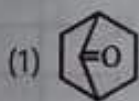


- (1) II (2) III  
(3) Both II and III (4) None of these

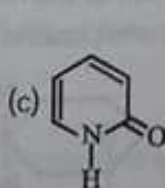
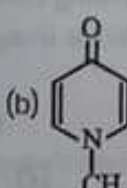
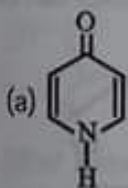
24. Number of structural isomers possible from molecular formula  $C_3H_6O$ ?  
 (1) 2 (2) 5 (3) 9 (4) 10
25. Number of structural isomers possible from molecular formula  $C_4H_6$  is:  
 (1) 7 (2) 8 (3) 9 (4) 10
26. The number of structural isomers possible from molecular formula  $C_3H_9N$ ?  
 (1) 2 (2) 3 (3) 4 (4) 5
27. The number of esters possible from molecular formula  $C_4H_8O_2$  is:  
 (1) 5 (2) 6 (3) 8 (4) 4
28. This molecule can be enolized involving:



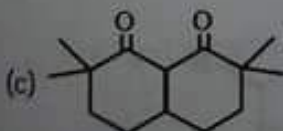
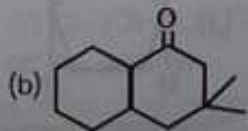
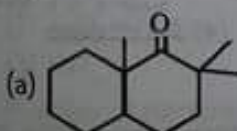
- (1)  $H_2$  (2)  $H_3$   
 (3)  $H_4$  (4) Cannot be enolized
29. Which of the following can exhibit tautomerism:



30. Which among these can exhibit tautomerism?

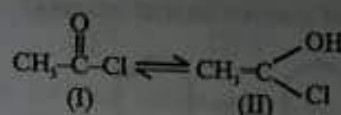


- (1) a only (2) b only  
 (3) c only (4) a and c
31. Which of following can exhibit tautomerism?



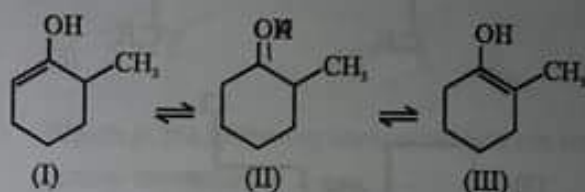
- (1) a only (2) b only  
 (3) c only (4) All of these

32. Which tautomer isomer is more stable:



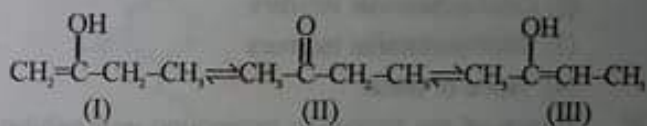
- (1) I  
 (2) II  
 (3) I = II  
 (4) None of these

33. Stability order of these tautomer is:-



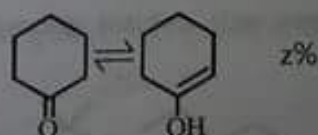
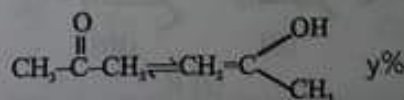
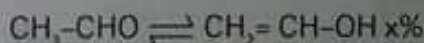
- (1) I > II > III  
 (2) III > II > I  
 (3) II > I > III  
 (4) II > III > I

34. Stability order among these tautomer is:



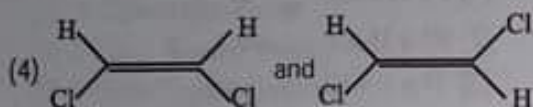
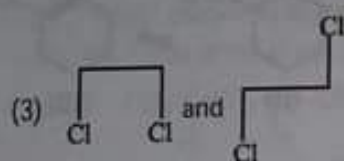
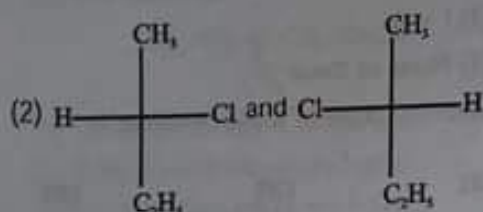
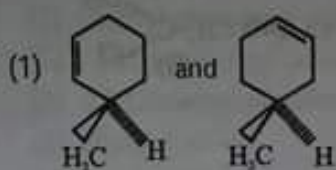
- (1) I > II > III  
 (2) III > II > I  
 (3) II > I > III  
 (4) II > III > I

35. The relation between the enol contents x, y and z should be in acidic medium.



- (1) x > y > z (2) z > y > x  
 (3) y > x > z (4) y > z > x

36. Which of the following pairs of isomers represents a pair of conformational isomers?



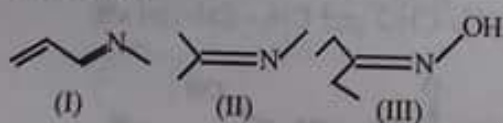
37. Geometrical isomers are:

- (1) Structural isomers  
(2) Conformational isomers  
(3) Configurational isomers  
(4) None of these

38. Which of the following compound will exhibit geometrical isomerism?

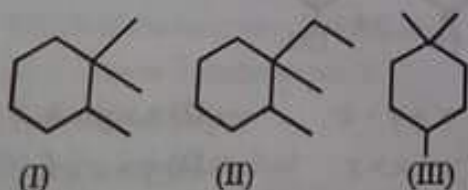
- (1)  $\text{CH}_2 = \text{CH} - \text{CH} = \text{CH}_2$   
(2)  $\text{CH}_2 = \text{CH} - \text{CH} = \text{CH} - \text{CH}_3$   
(3)  $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{CH} = \text{CH}_2$   
(4)  $\text{CH}_2 = \text{CH} - \text{C} \equiv \text{C} - \text{CH} = \text{CH}_2$

39. Which of these will exhibit geometrical isomerism?



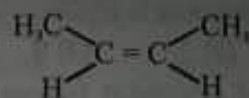
- (1) I  
(2) II  
(3) III  
(4) I and II

40. Which of these will exhibit geometrical isomerism?



- (1) I  
(2) II  
(3) III  
(4) All of these

41. This compound can be named as:



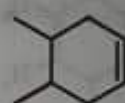
- (1) Cis-2-butene  
(2) (Z)-2-butene  
(3) (1) and (2)  
(4) R-2-butene

42. How many geometrical isomers of this compound are possible?



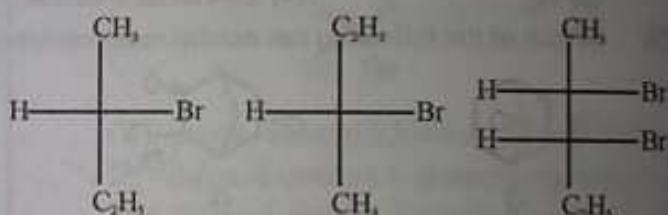
- (1) 0  
(2) 2  
(3) 3  
(4) 4

43. How many geometrical isomers of this compound are possible:



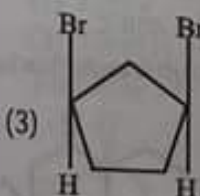
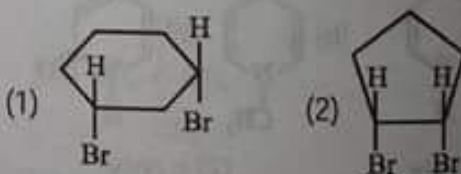
- (1) 0  
(2) 2  
(3) 3  
(4) 4

44. Which of these molecule is optically active?



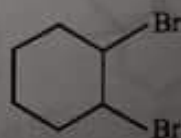
- (1) I  
(2) II  
(3) III  
(4) All of these

45. Which of the following compounds can be non-superimposable mirror images?



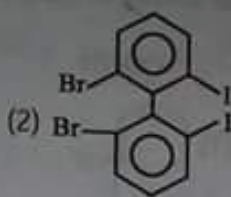
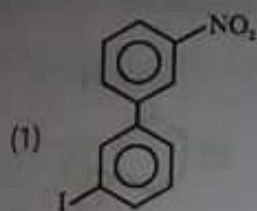
(4) none of the above  
All of these

46. How many stereoisomers are possible in this compound?



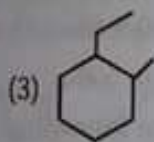
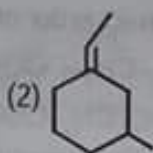
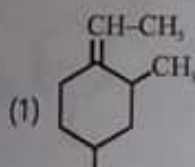
- (1) 2  
(2) 3  
(3) 4  
(4) 5

47. Which of the following biphenyl is optical active:



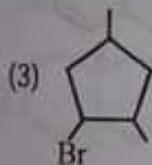
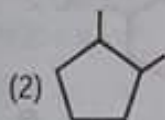
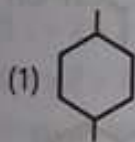
(4) None

48. Which of the following is optically active



(4) All of these

49. Which of the following can be a meso compound?



(4) All of these

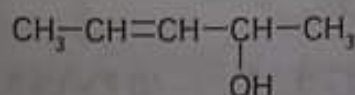
50. Most stable conformation of n-butane is:

- (1) Fully eclipsed      (2) Staggered  
(3) Partially eclipsed      (4) Gauche

51. Which of the following can show conformation isomerism:

- (1)  $\text{CD}_3\text{-H}$  (2)  $\text{CH}_3(\text{OH})\text{CH}_2\text{OH}$   
(3)  $\text{NH}_3$  (4) All of these

52. Number of stereoisomers of the given compound is

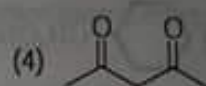
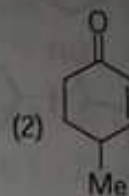


- (1) 2      (2) 3      (3) 4      (4) 6

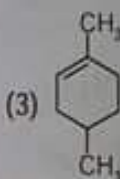
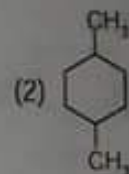
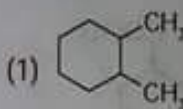
53. How many structures of aldehydes are possible for molecular formula  $C_6H_{10}O$ ?

- (1) 4      (2) 7      (3) 6      (4) 8

54. Which of the following can show both tautomerism and optical isomerism

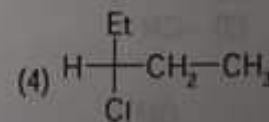
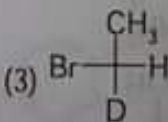
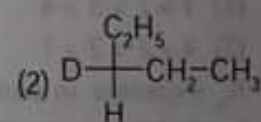
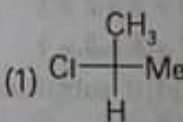


55. Which of the following compound will not show optical isomerism

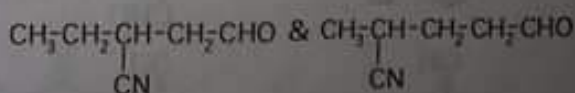


(4) all of these

56. Which of the following molecule has non-superimposable mirror images?

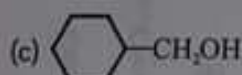
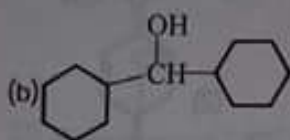
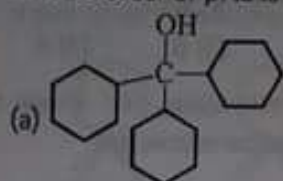


57. What is relation between following compounds



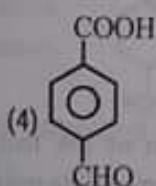
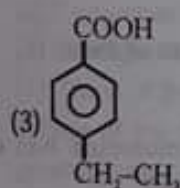
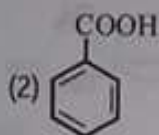
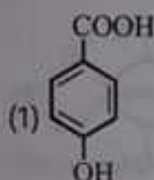
- (1) positional isomers
- (2) chain isomers
- (3) optical isomers
- (4) metamers

## GOC-I

58. Correct order of  $pK_a$  is :

- (1)  $3 > 2 > 1$                       (2)  $2 > 3 > 1$   
 (3)  $1 > 2 > 3$                       (4)  $1 > 3 > 2$

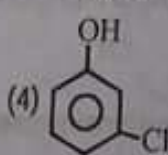
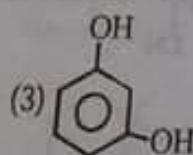
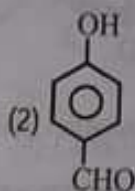
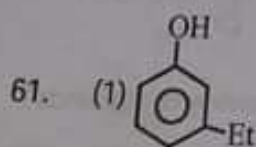
59. Correct order of acidic strength :



- (1)  $1 > 2 > 3 > 4$                       (2)  $4 > 3 > 2 > 1$   
 (3)  $4 > 2 > 3 > 1$                       (4)  $2 > 4 > 3 > 1$

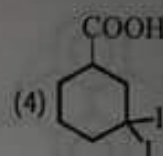
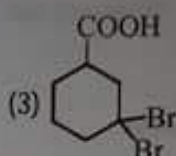
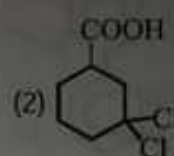
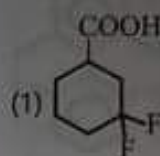
60.  $K_a$  increases in benzoic acid if substituent X is bonded at para position then X is :

- (1)  $-\text{OCH}_3$                       (2)  $-\text{CH}_3$   
 (3)  $-\text{CN}$                       (4)  $-\text{NH}_2$

Decreasing order of  $pK_a$  is :

- (1)  $1 > 2 > 3 > 4$                       (2)  $1 > 3 > 4 > 2$   
 (3)  $2 > 4 > 1 > 3$                       (4)  $4 > 3 > 2 > 1$

62. Which of the following present the correct order of acidity in the given compound :



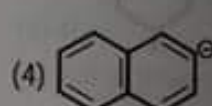
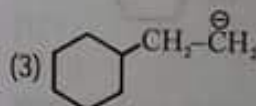
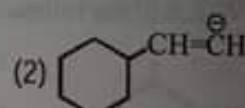
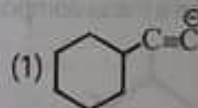
- (1)  $2 > 1 > 3 > 4$                       (2)  $4 > 3 > 2 > 1$   
 (3)  $1 > 2 > 3 > 4$                       (4)  $3 > 2 > 1 > 4$

63. The correct order of  $K_a$  is :

- (i)  $\text{CH}_3-\text{CH}_2-\text{COOH}$   
 (ii)  $\text{OHC}-\text{CH}_2-\text{COOH}$   
 (iii)  $\text{Ph}-\text{CH}_2-\text{COOH}$

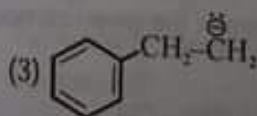
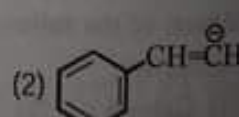
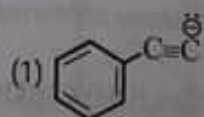
- (1)  $\text{iii} > \text{ii} > \text{i}$                       (2)  $\text{i} > \text{ii} > \text{iii}$   
 (3)  $\text{ii} > \text{iii} > \text{i}$                       (4)  $\text{i} > \text{iii} > \text{ii}$

64. The stability of carbanion in the following :



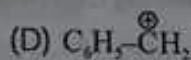
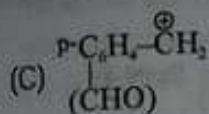
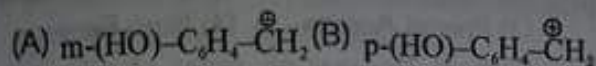
- (1)  $4 > 2 > 1 > 3$   
 (2)  $4 > 1 > 2 > 3$   
 (3)  $1 > 4 > 2 > 3$   
 (4)  $1 > 2 > 3 > 4$

65. Basic strength order will be :



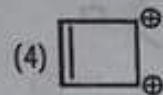
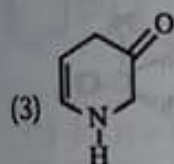
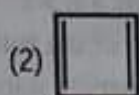
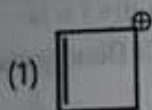
- (1)  $1 > 2 > 3$                       (2)  $2 > 1 > 3$   
 (3)  $3 > 1 > 2$                       (4)  $3 > 2 > 1$

66. Decreasing order of stability of the following carbocation ?



- (1)  $B > A > D > C$  (2)  $B > D > A > C$   
(3)  $B > D > C > A$  (4)  $D > C > B > A$

67. Which of the following compound will be Aromatic?

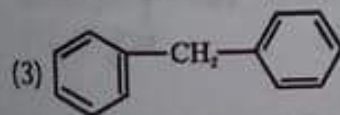
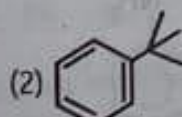
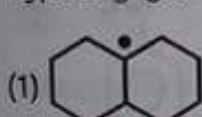


68. Compare the Heat of Hydrogenation and arrange in Decreasing order:



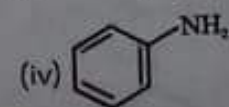
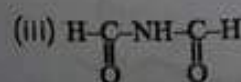
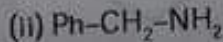
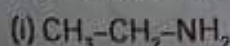
- (1)  $1 > 2 > 3$  (2)  $2 > 1 > 3$   
(3)  $3 > 2 > 1$  (4)  $1 > 3 > 2$

69. Which of the following compound will show Hyperconjugation?



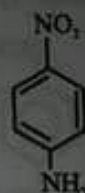
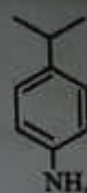
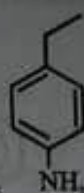
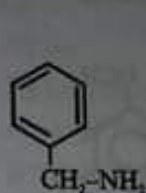
- (1) 2 only (2) 1 and 3 only  
(3) 1 and 2 (4) All of these

70. Correct order of  $pK_b$  is



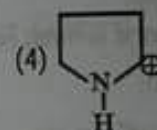
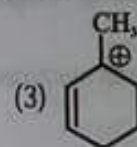
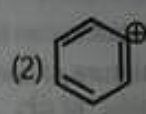
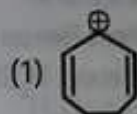
- (1)  $i > ii > iii > iv$  (2)  $iii > iv > i > ii$   
(3)  $iii > iv > ii > i$  (4)  $ii > i > iii > iv$

71. Correct Decreasing order of  $pK_b$  is:

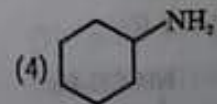
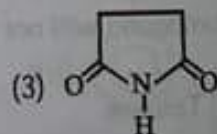
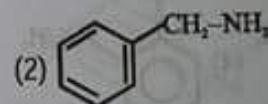
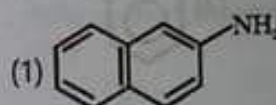


- (1)  $1 > 2 > 3 > 4$  (2)  $4 > 3 > 2 > 1$   
(3)  $2 > 1 > 3 > 4$  (4)  $1 > 2 > 4 > 3$

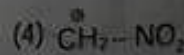
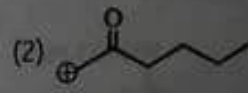
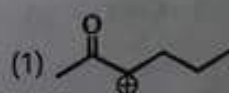
72. Which of the following carbocation is more stable



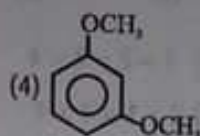
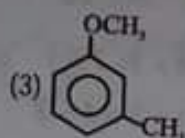
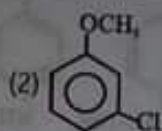
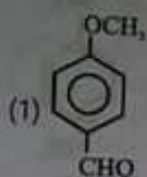
73. Which of the following will be least Basic?



74. Which one of the following Carbocation is most stable:



75. The correct Increasing order of Reactivity for following molecule towards E.S.R.

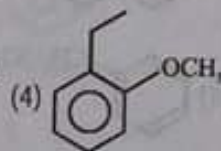
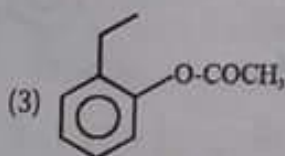
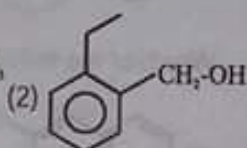
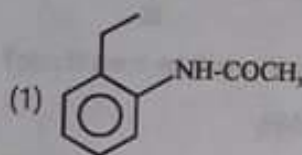


- (1)  $3 > 4 > 2 > 1$  (2)  $4 > 3 > 2 > 1$   
 (3)  $1 > 2 > 3 > 4$  (4)  $1 > 3 > 2 > 4$

76. Nitro Benzene can be prepared from Benzene by using mixture of conc.  $\text{HNO}_3$  and conc.  $\text{H}_2\text{SO}_4$  in the mixture,  $\text{H}_2\text{SO}_4$  act as a

- (1) Catalyst (2) Reducing Reagent  
 (3) Acid (4) Base

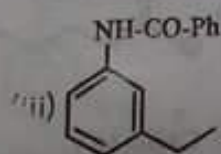
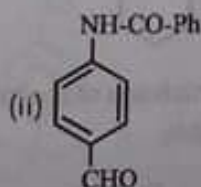
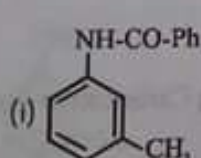
77. Which one is most Reactive towards electrophilic Reagent:



78. Which of the following compound will not give Fridal craft Reaction?

- (1) Mesitylene (2) Toluene  
 (3) Benzaldehyde (4) Xylene

79. Correct Reactivity order of E.S.R:

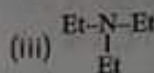
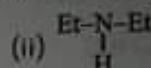
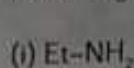


- (1)  $i > ii > iii$  (2)  $iii > ii > i$   
 (3)  $i > iii > ii$  (4)  $ii > i > iii$

80. Most reactive towards E.S.R:

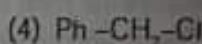
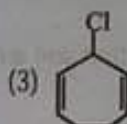
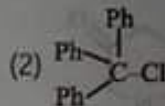
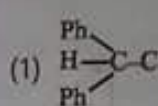
- (1) Benzene (2) Chloro Benzene  
 (3) Phenyl Acetate (4) Nitro Benzene

81. Correct Decreasing order of  $\text{pK}_b$  value of Following Compounds is:

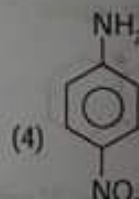
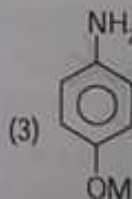
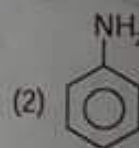
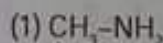


- (1)  $i > ii > iii > iv$  (2)  $iv > i > iii > ii$   
 (3)  $iv > iii > ii > i$  (4)  $ii > iii > i > iv$

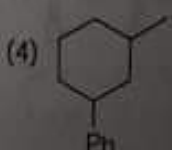
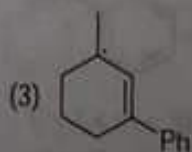
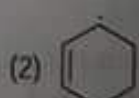
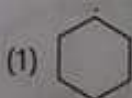
82. In which of the following C-Cl Bond ionisation shall give most stable ion?



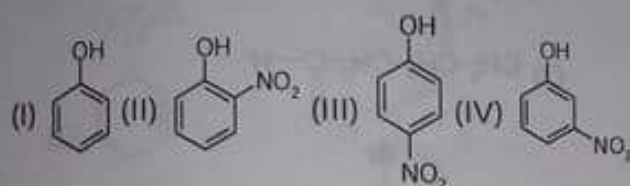
83. Which of following is most basic



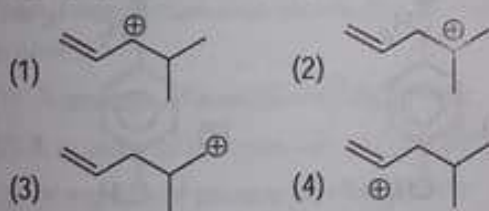
84. Which one of the following is most stable

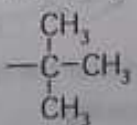
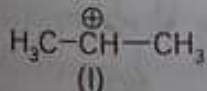
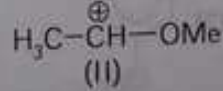
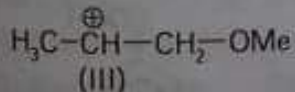


85. Which of the following is insoluble in  $\text{NaHCO}_3$ ?  
 (1) Benzoic acid (2) Benzene sulphonic acid  
 (3) o-Nitrophenol (4) Picric acid
86. Which is the correct decreasing order of basic strength in aqueous medium  
 (1)  $(\text{CH}_3)_3\text{N} > (\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2 > \text{NH}_3$   
 (2)  $(\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2 > (\text{CH}_3)_3\text{N} > \text{NH}_3$   
 (3)  $(\text{CH}_3)_2\text{NH} > (\text{CH}_3)_3\text{N} > \text{CH}_3\text{NH}_2 > \text{NH}_3$   
 (4)  $\text{CH}_3\text{NH}_2 > (\text{CH}_3)_2\text{NH} > (\text{CH}_3)_3\text{N} > \text{NH}_3$
87. Which of the following is correct order of acidic strength

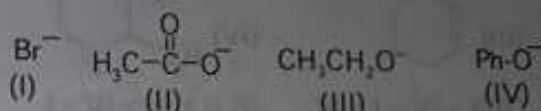


- (1)  $\text{I} > \text{II} > \text{III} > \text{IV}$  (2)  $\text{III} > \text{II} > \text{IV} > \text{I}$   
 (3)  $\text{II} > \text{III} > \text{IV} > \text{I}$  (4)  $\text{IV} > \text{II} > \text{III} > \text{I}$
88. Correct order of basic strength in gas phase is  
 (I)  $\text{CH}_3\text{-NH}_2$  (II)  $(\text{CH}_3)_2\text{NH}$   
 (III)  $(\text{CH}_3)_3\text{N}$  (IV)  $\text{NH}_3$   
 (1)  $\text{I} > \text{II} > \text{III} > \text{IV}$  (2)  $\text{II} > \text{I} > \text{III} > \text{IV}$   
 (3)  $\text{III} > \text{II} > \text{I} > \text{IV}$  (4)  $\text{II} > \text{III} > \text{I} > \text{V}$
89. Which carbocation is most stable

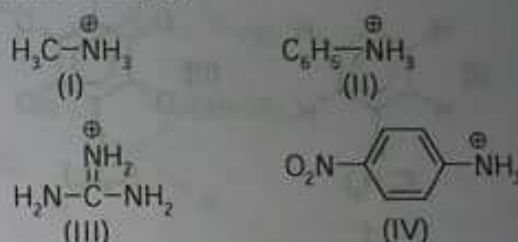


90. Which of the following group has maximum hyper conjugation effect but minimum inductive effect  
 (1)  $-\text{CH}_3$  (2)  $-\text{CH}_2\text{-CH}_3$   
 (3)  $-\text{CD}_3$  (4) 
91. What is the correct order of decreasing stability of the following cations  
 (I)  (II)   
 (III)   
 (1)  $\text{II} > \text{I} > \text{III}$  (2)  $\text{II} > \text{III} > \text{I}$   
 (3)  $\text{III} > \text{I} > \text{II}$  (4)  $\text{I} > \text{II} > \text{III}$

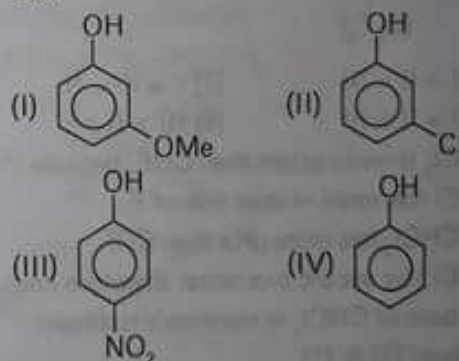
92. Phenol and carboxylic acid can be distinguished by  
 (1) Na (2)  $\text{NaHCO}_3$   
 (3) Litmus test (4) all of these
93. Arrange the following in order of their leaving group tendency?



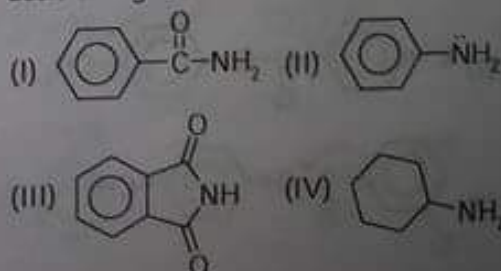
- (1)  $\text{I} > \text{II} > \text{III} > \text{IV}$  (2)  $\text{I} > \text{III} > \text{II} > \text{IV}$   
 (3)  $\text{I} > \text{II} > \text{IV} > \text{III}$  (4)  $\text{I} > \text{IV} > \text{III} > \text{II}$
94. Arrange the following in order of their decreasing acidic strength?



- (1)  $\text{I} > \text{II} > \text{III} > \text{IV}$  (2)  $\text{IV} > \text{II} > \text{I} > \text{III}$   
 (3)  $\text{IV} > \text{III} > \text{II} > \text{I}$  (4)  $\text{IV} > \text{I} > \text{II} > \text{III}$
95. Arrange the following towards their reactivity for ESR

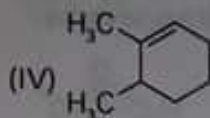
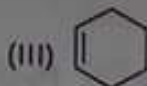
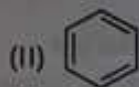
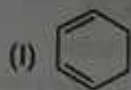


- (1)  $\text{I} > \text{IV} > \text{II} > \text{III}$  (2)  $\text{I} > \text{II} > \text{IV} > \text{III}$   
 (3)  $\text{I} > \text{II} > \text{III} > \text{IV}$  (4)  $\text{II} > \text{I} > \text{III} > \text{IV}$
96. Arrange the following in order of their decreasing basic strength



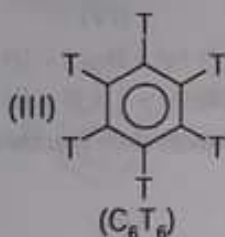
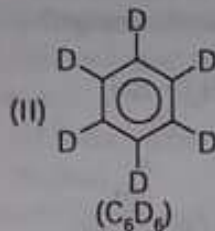
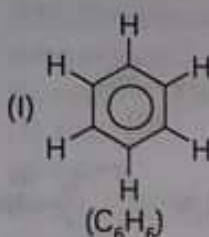
- (1)  $\text{IV} > \text{I} > \text{II} > \text{III}$  (2)  $\text{IV} > \text{I} > \text{III} > \text{II}$   
 (3)  $\text{IV} > \text{II} > \text{I} > \text{III}$  (4)  $\text{I} > \text{II} > \text{III} > \text{IV}$

97. Arrange the following in decreasing order of their C=C bond length



- (1) II > IV > I > III      (2) II > III > IV > I  
 (3) II > I > IV > III      (4) None

98. Arrange the following in order of their reactivity towards nitration



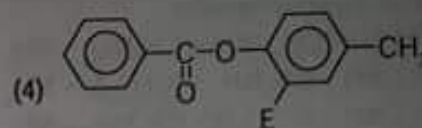
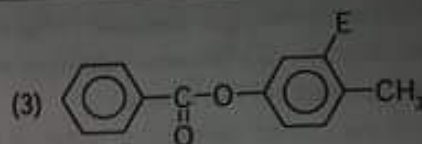
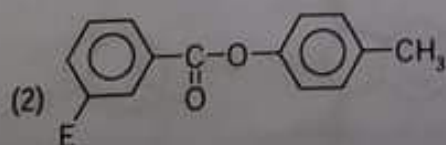
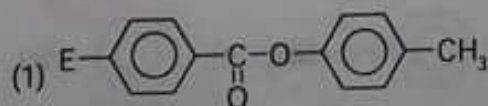
- (1) I = II = III      (2) I ≈ II ≈ III  
 (3) I > II > III      (4) III > II > I

99. CHCl<sub>3</sub> is more acidic than CHF<sub>3</sub> because

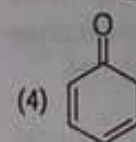
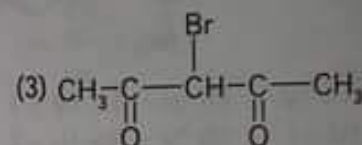
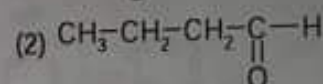
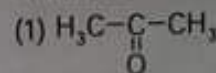
- (1) Cl has more -I than that of F  
 (2) CHCl<sub>3</sub> has more pK<sub>a</sub> than CHF<sub>3</sub>  
 (3) Cl has vacant d-orbital therefore conjugate base of CHCl<sub>3</sub> is resonance stabilised  
 (4) both (1) & (2)

100.  $\xrightarrow{E^+}$  major product

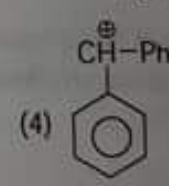
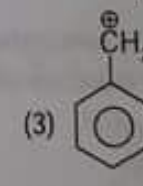
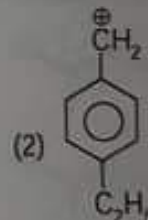
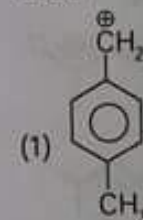
major product will be



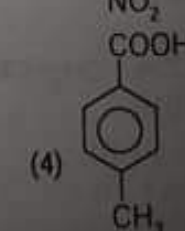
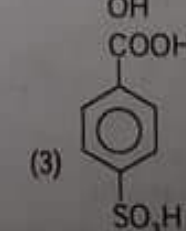
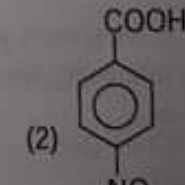
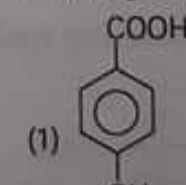
101. Which of the following leads to maximum enolisation



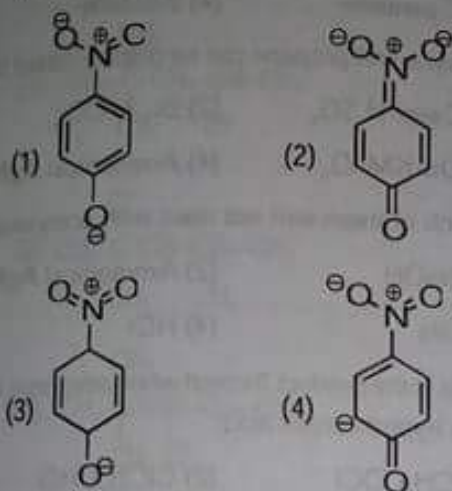
102. Which of the following carbocation is maximum stable



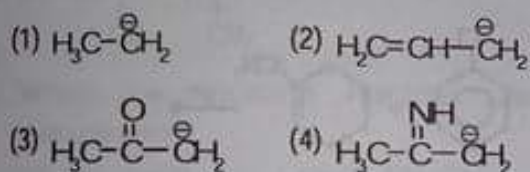
103. Which of the following is strongest acid among following



104. Which of the following is not an electrophile  
(1)  $\text{H}_3\text{O}^+$  (2)  $\text{BH}_3$  (3)  $\text{CH}_3^+$  (4)  $\text{ZnCl}_2$
105. The most unlikely representation of resonance structure of p-nitrophenoxide is



106. Which of the following carbanion is most stable?



#### HYDROCARBON

107. Phenyl magnesium bromide reacts with methanol to give :-

- (1) A mixture of anisole and  $\text{Mg}(\text{OH})\text{Br}$   
(2) A mixture of benzene and  $\text{Mg}(\text{OMe})\text{Br}$   
(3) A mixture of toluene and  $\text{Mg}(\text{OH})\text{Br}$   
(4) A mixture of phenol and  $\text{Mg}(\text{Me})\text{Br}$



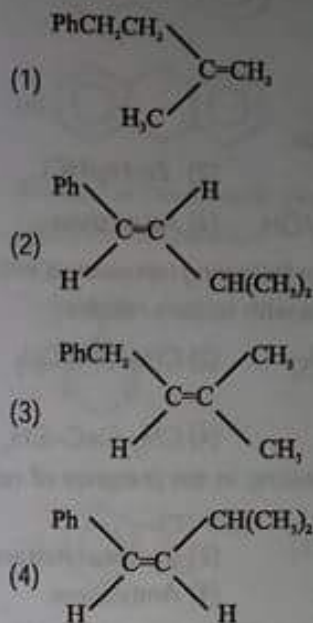
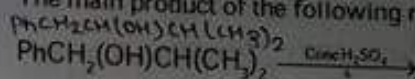
Identify the end product in the given reaction sequence

- (1) Glyoxal  
(2) Propanedial  
(3) Glyoxal + Butanedial  
(4) Glyoxal + Propanediol

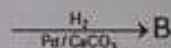
109. The compound formed as a result of oxidation of ethyl benzene by  $\text{KMnO}_4$  is

- (1) Benzophenone (2) Acetophenone  
(3) Benzoic acid (4) Benzyl alcohol

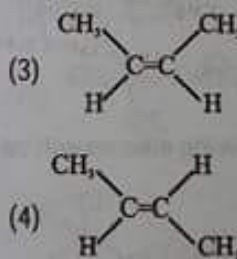
110. The main product of the following reaction is:



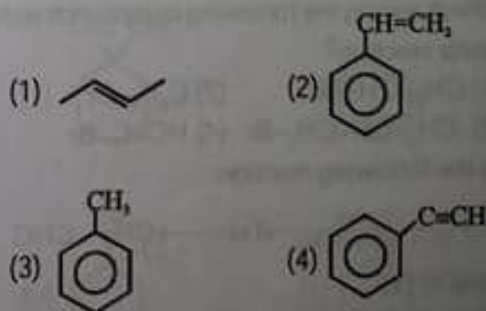
111.  $\text{CH}_3-\text{CH}(\text{Cl})-\text{CH}(\text{Cl})-\text{CH}_3 \xrightarrow[\text{(ii) NaNH}_2]{\text{(i) Alc. KOH}} \text{A (major)}$

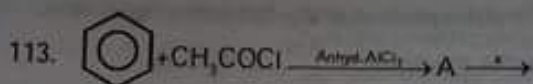


- (1)  $\text{CH}_3\text{CH}_2-\text{CH}=\text{CH}_2$   
(2)  $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_3$



112. Which of the following does not decolourise reddish brown solution of  $\text{Br}_2/\text{CCl}_4$ :





Reagent x can be

- (1) HI/Red P (2) Zn-Hg/HCl  
(3)  $\text{NH}_2\text{-NH}_2/\text{OH}$  (4) All of these

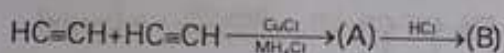
114. Which one of the following compounds will give white precipitate with tollen's reagent?

- (1) CH3-CH(CH3)-CH3 (2) CH3-CH=CH2  
(3) CH3-C#CH (4) CH3-C#C-CH3

115. Acetylene on heating in the presence of red hot Fe tube gives:

- (1) Benzene (2) Cyclooctatetraene  
(3) naphthalene (4) Anthracene

116. In the reaction sequence



(B) will be:-

- (1) CH3-CH(CH3)-C#CH  
(2) CH3-CH(Cl)-CH=CH2  $\text{CH}_2=\text{CH}-\text{C}(\text{Cl})=\text{CH}_2$   
(3) CH3-CH=CH-CH=CH-Cl  $\text{CH}_2=\text{CH}-\text{C}(\text{Cl})=\text{CH}_2$   
(4) CH3-CH2-C#C-Cl

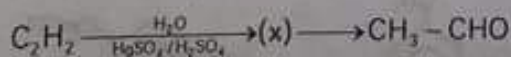
117. Which among the following alkenes will be most stable:

- (1) Ethene  
(2) 2-Methyl propene  
(3) 2,3-Dimethyl-2-butene  
(4) 2-butene

118. Which among the following compounds will give wurtz reaction?

- (1) CH2=CH-Br (2) C6H5-Br  
(3) CH2=CH-CH2-Br (4) HC#C-Br

119. In the following reaction:



what is (x)

- (1) CH3-CH2-OH (2) CH3-O-CH3  
(3) CH3-CH2-CHO (4) CH2=CH-OH

120. Anti-Markounikov's addition of HBr is not observed in:

- (1) propene (2) 1-butene  
(3) 2-pentene (4) 2-butene

121. Propyne and propene can be distinguished by:

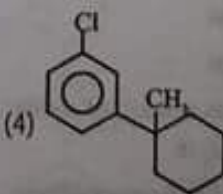
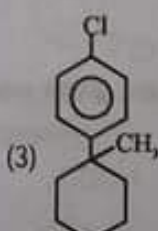
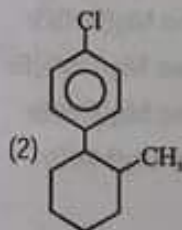
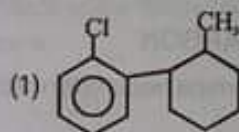
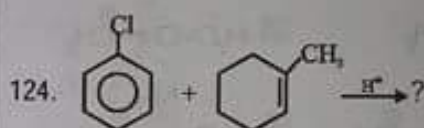
- (1) Conc.  $\text{H}_2\text{SO}_4$  (2)  $\text{Br}_2$  in  $\text{CCl}_4$   
(3) Dil- $\text{KMnO}_4$  (4) Ammonical  $\text{AgNO}_3$

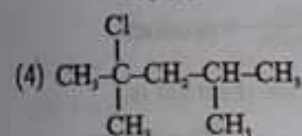
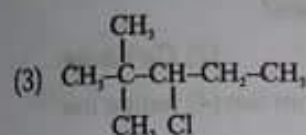
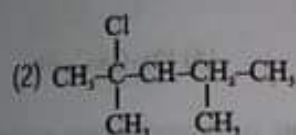
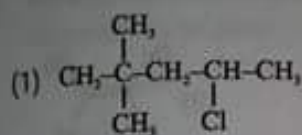
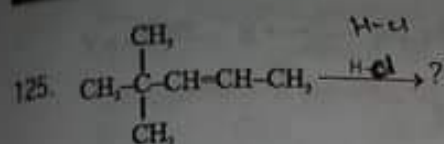
122. Which of these will not react with acetylene:

- (1) NaOH (2) Ammonical  $\text{AgNO}_3$   
(3) Na (4) HCl

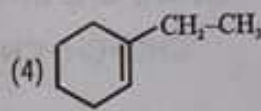
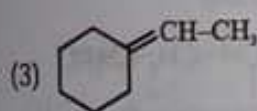
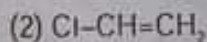
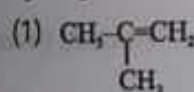
123. What is the product formed when acetylene reacts with hypochlorous acid:

- (1) CH3COCl (2) ClCH2CHO  
(3) Cl2CHCHO (4) ClCH2COOH





126. Which is minimum reactive towards hydrogenation:



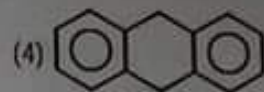
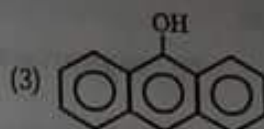
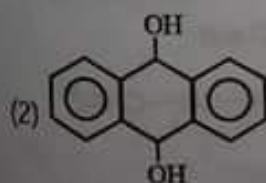
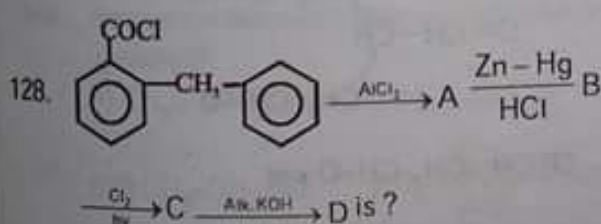
127. Debromination of d-2, 3-dibromobutane gives:

(1) Trans-2-butene

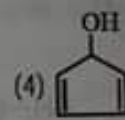
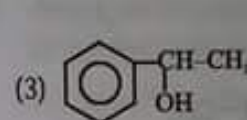
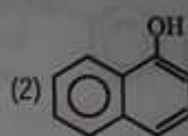
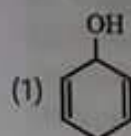
(2) Cis-2-butene

(3) 1-butene

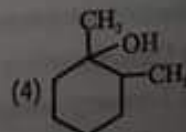
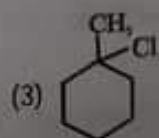
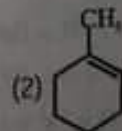
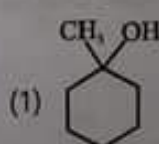
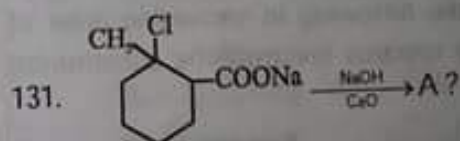
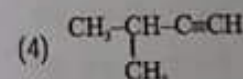
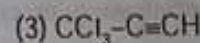
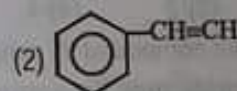
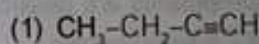
(4) 2-butyne



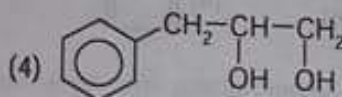
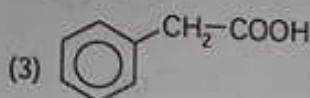
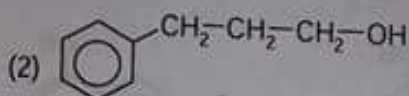
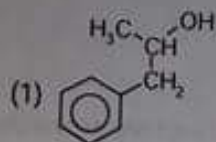
129. Which is maximum reactive towards acid catalysed dehydration:



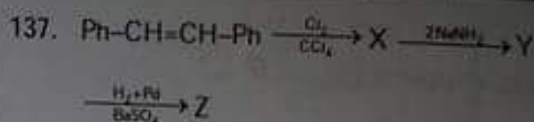
130. Which gives ketonic group after hydroboration oxidation:



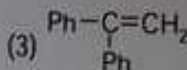
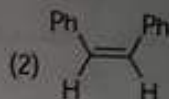
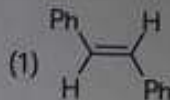
132. c1ccccc1CH=CH2 on oxymercuration-demercuration produces the major product



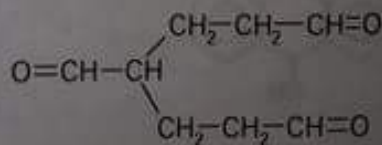
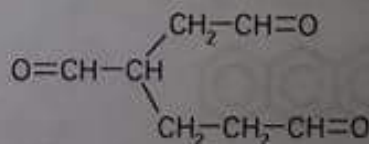
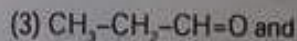
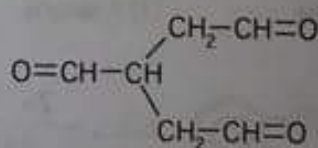
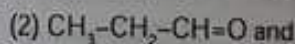
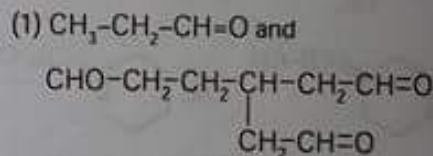
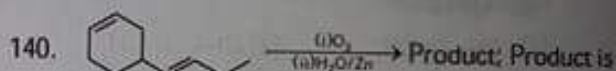
133. How many chiral compounds are possible on mono-chlorination of 2-Methyl butane?  
 (1) 6 (2) 8 (3) 2 (4) 4
134. Ozonolysis of an organic compound 'A' produces acetone and propionaldehyde in equimolar mixture. Identify A from the following compounds  
 (1) 2-methyl-1-pentene  
 (2) 1-pentene  
 (3) 2-pentene  
 (4) 2-Methyl-2-pentene
135. Arrange the following in decreasing order of reactivity towards electrophilic substitution reaction  
 Aniline (I) Acetanilide (II)  
 Phenol (III) Anilinium chloride (IV)  
 (1) II > I > III > IV  
 (2) I > III > II > IV  
 (3) III > II > IV > I  
 (4) IV > II > I > III
136. Which of the following is most basic  
 (1) Diphenylamine  
 (2) Triphenyl amine  
 (3) p-Nitroaniline  
 (4) Benzylamine



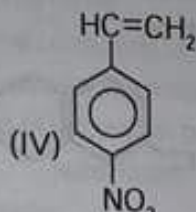
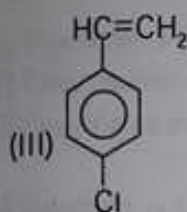
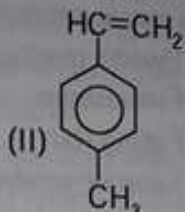
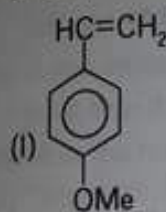
Product Z is



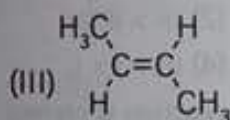
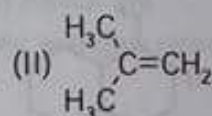
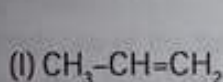
138. Which Intermediate is formed during addition of halogen on alkenes?  
 (1) Carbocation (2) Carbanion  
 (3) cyclic halonium ion (4) halide ion
139. CH3-C#CH  $\xrightarrow[\text{H}_2\text{SO}_4]{\text{HgSO}_4}$  product  
 Product of the above reaction is  
 (1) an aldehyde (2) a ketone  
 (3) an alcohol (4) a carboxylic acid



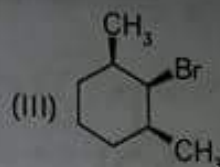
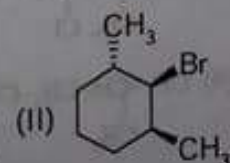
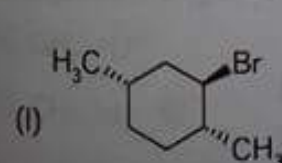
141. No. of structural isomeric alkenes (molecular formula =  $C_6H_{12}$ ) which all give n-hexane on hydrogenation in presence of metal catalyst  
 (1) 2 (2) 3 (3) 4 (4) 5
142. Arrange the following towards their reactivity for electrophilic addition reaction (EAR)



- (1) I > III > II > IV (2) II > I > III > IV  
 (3) I > II > III > IV (4) II > III > I > IV
143. Arrange the following towards reactivity for heat of hydrogenation



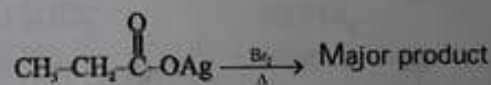
- (1) II > I > III (2) I > II > III  
 (3) II > III > I (4) I > III > II
144. Arrange the following towards their reactivity for hydration?
- (I)  $CH_3O-CH=CH_2$  (II)  $F-CH=CH_2$
- (III)  $CH_3-CH=CH_2$  (IV)
- (1) II > I > III > IV (2) I > III > IV > II  
 (3) I > II > III > IV (4) I > IV > III > II
145. Arrange the following towards their reactivity for  $E^2$  elimination?



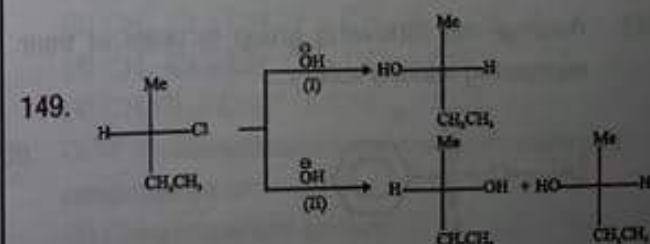
- (1) III > I > II (2) I > II > III  
 (3) II > I > III (4) III > II > I
146. Benzene + Acetyl chloride  $\xrightarrow{AlCl_3}$  product  
 Name of above reaction is  
 (1) Wurtz fittig reaction  
 (2) Gattermann reaction  
 (3) Friedel Craft reaction  
 (4) Shotten baumann reaction

### ALKYL HALIDE

147. Among the following alkyl bromide correct order of  $S_N1$  reactivity is:
- (1)
- (2)
- (3)
- (4)
- (1) 1 > 2 > 3 > 4 (2) 4 > 2 > 3 > 1  
 (3) 4 > 3 > 2 > 1 (4) 2 > 4 > 3 > 1
148. The product of the reaction is



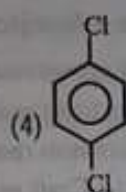
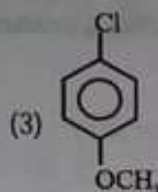
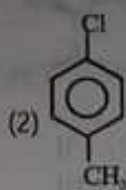
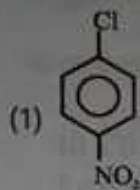
- (1)  $CH_2=CH_2$  (2)  $CH_3-CH_2-Br$   
 (3)  $CH_3CH_2CH_2-Br$  (4)  $CH_3-CH=CH-CH_3$



Reaction I<sup>st</sup> and II<sup>nd</sup> are:

- (1) Both  $S_N1$  (2) Both  $S_N2$   
 (3) I  $S_N1$ , II  $S_N2$  (4) I  $S_N2$ , II  $S_N1$

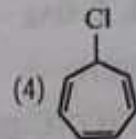
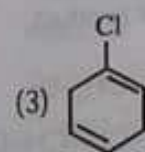
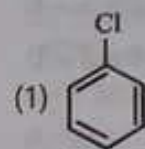
150. Which of the following compound undergo hydrolysis most easily:



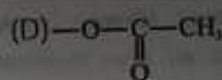
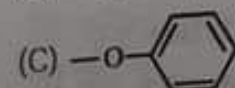
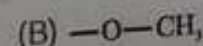
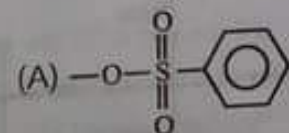
151. Consider the reaction:  
 $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} + \text{NaCN} \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{C}\equiv\text{N} + \text{NaBr}$

The correct statement is :-

- (1) The reaction will be fastest in water
  - (2) The reaction will be fastest in N, N-dimethylformamide (DMF)
  - (3) Transition state of  $\text{S}_{\text{N}}2$  is tetrahedral and  $\text{sp}^3$  hybridized
  - (4) If conc. of alkyl bromide is tripled and conc. of  $\text{CN}^-$  is reduced to half rate of  $\text{S}_{\text{N}}2$  increased by 2 times
152. Which of the following compound will give curdy precipitate with  $\text{AgNO}_3$  solution:



153. Arrange the following group in order of their decreasing leaving ability:

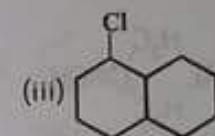
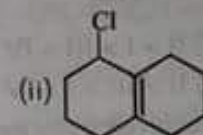
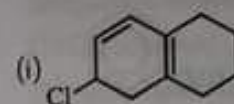


- (1)  $\text{A} > \text{D} > \text{B} > \text{C}$
- (2)  $\text{A} > \text{D} > \text{C} > \text{B}$
- (3)  $\text{A} > \text{B} > \text{C} > \text{D}$
- (4)  $\text{D} > \text{C} > \text{B} > \text{A}$

154.  $(\text{CH}_3)_2\text{CHCl} + \text{NaI} \xrightarrow{\text{Acetone}} (\text{CH}_3)_2\text{CHI}$

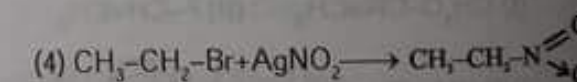
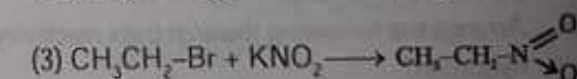
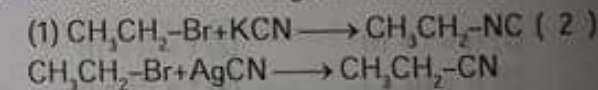
The above reaction is known as

- (1) Swart's reaction
  - (2) Finkelstein's
  - (3) Fitting Rxn
  - (4) Sabatier-senderence Rxn
155. The correct order for  $\text{E}_2$  reaction with alc. KOH will be:-

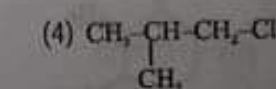
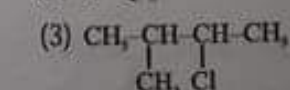
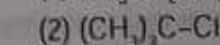
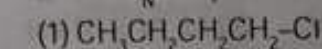


- (1)  $\text{i} > \text{ii} > \text{iii}$
- (2)  $\text{iii} > \text{ii} > \text{i}$
- (3)  $\text{ii} > \text{i} > \text{iii}$
- (4)  $\text{iii} > \text{i} > \text{ii}$

156. Which of the following reaction is correct:



157. Which of the following compound is most reactive toward  $\text{S}_{\text{N}}2$  displacement?



158. Which of the following statement is incorrect :-

- (1) Boiling point of alkylhalide is  $R-I > R-Br > R-Cl > R-F$
- (2) Alkyl halide are soluble in organic solvent and insoluble in water generally
- (3) Freons are used for aerosol propellant, refrigeration and air conditioning purpose.
- (4) -o and -m dichlorobenzene has higher melting point than those of p-isomer

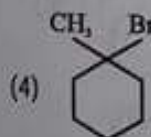
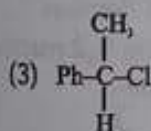
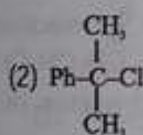
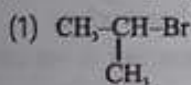
159. Which of the following is correctly match:-

- (A) Chloramphenicol  $\rightarrow$  (1) iodine containing Hormone
  - (B) Thyroxine  $\rightarrow$  (2) Chlorine containing antibiotic
  - (C) Chloroquine  $\rightarrow$  (3) Treatment for malaria
  - (D) Fluorinated compound (4) Potential blood substituted
  - (E) Iodoform  $\rightarrow$  (5) Antiseptic
- (1) A, B, C
  - (2) B, C
  - (3) C, D, E
  - (4) D, E

160.  $C_2F_3Cl_3$  is named as:-

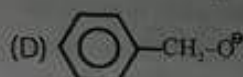
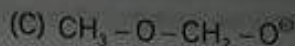
- (1) Freon -112
- (2) Freon-112
- (3) Freon-113
- (4) Freon-114

161. Which one of the following will give racemised product in  $C_2H_5OH$ ?



162. Arrange the following group in order of their nucleophilic strength:-

- (A)  $CH_3 - O^-$
- (B)  $CH_3CH_2 - O^-$



- (1)  $A > B > C > D$
- (2)  $D > B > C > A$
- (3)  $B > A > D > C$
- (4)  $A > B > D > C$

163. Which of the following molecule would have a carbon halogen bond most susceptible to nucleophilic substitution?

- (1) 2-Fluorobutane
- (2) 2-Chlorobutane
- (3) 2-Bromo butane
- (4) 2-Iodobutane

164. Which of the following is most reactive toward nucleophilic substitution reaction?

- (1)  $CH_2=CH-Cl$
- (2)  $C_6H_5-Cl$
- (3)  $CH_3-CH=CH-Cl$
- (4)  $Cl-CH_2-CH=CH_2$

165. An  $S_N2$  reaction at an asymmetric carbon of a compound always give:

- (1) an enantiomer of the substrate
- (2) a product with opposite rotation
- (3) a mixture of diastereomer
- (4) a single stereoisomers

166. The synthesis of alkyl fluoride is best accomplished by:

- (1) Free radical fluorination
- (2) Sandmeyer reaction
- (3) Finkelstein reaction
- (4) Swarts reaction

167. The reagent that brings about the conversion of (R)-butan-2-ol to (R)-2-chlorobutane is:-

- (1)  $SOCl_2$
- (2)  $PCl_5$
- (3)  $PCl_3$
- (4) all of them

168. Which of the following is correct order of dipole moment:-

- (1)  $CH_3-F > CH_3-Cl > CH_3-Br > CH_3-I$
- (2)  $CH_3-Cl > CH_3-F > CH_3-Br > CH_3-I$
- (3)  $CH_3-Cl > CH_2Cl_2 > CCl_4 > CHCl_3$
- (4)  $CH_2Cl_2 > CH_3Cl > CHCl_3 > CCl_4$

169. DDT is manufactured by the acid catalysed condensation of:-

- (1) Chloroform and acetone
- (2) Chloroform and nitric acid
- (3) Chlorobenzene and chloral
- (4) Chlorobenzene and chloroform

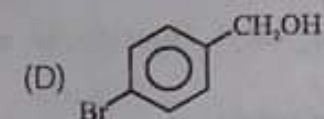
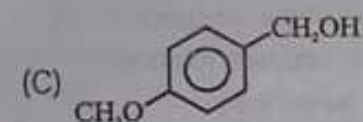
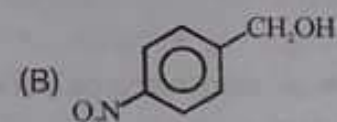
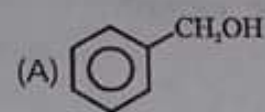
170. Which of the following compound is used as refrigerant?

- (1)  $\text{CF}_4$  (2)  $\text{CCl}_4$   
 (3)  $\text{CCl}_2\text{F}_2$  (4)  $\begin{array}{c} \text{CH}_3 - \text{CH}_2 \\ | \quad | \\ \text{OH} \quad \text{OH} \end{array}$

171. Which of the following is added to chloroform in a small quantity before is bottled for sale?

- (1)  $\text{CH}_3\text{OH}$  (2)  $\text{C}_2\text{H}_5\text{Cl}$   
 (3)  $\text{C}_2\text{H}_5\text{OH}$  (4)  $\text{AgNO}_3$

172. Arrange the following compound for their reactivity toward nucleophilic substitution with  $\text{HBr}$ ?

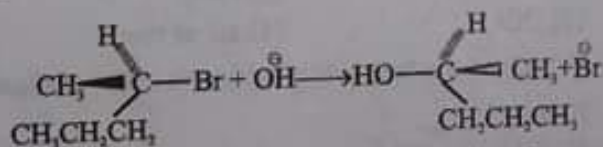


- (1)  $A > B > C > D$  (2)  $C > A > D > B$   
 (3)  $D > C > B > A$  (4)  $B > D > A > C$

173. Which of the following is secondary alkyl halide?

- (1) Isobutyl chloride (2) Isopentyl chloride  
 (3) Isopropyl chloride (4) Neopentyl chloride

174. The reaction take place by mechanism is:



- (1)  $\text{S}_{\text{N}}1$  (2)  $\text{S}_{\text{N}}2$  (3)  $\text{S}_{\text{N}}1$  (4)  $\text{S}_{\text{N}}2$

175. Which of the following reaction occur most rapidly?

- (1)  $(\text{CH}_3)_2\text{CHOH} \xrightarrow{\text{HBr}}$   
 (2)  $(\text{CH}_3)_2\text{CHOH} \xrightarrow{\text{HI}}$   
 (3)  $(\text{CH}_3)_3\text{CHOH} \xrightarrow{\text{HBr}}$   
 (4)  $(\text{CH}_3)_3\text{CHOH} \xrightarrow{\text{HI}}$

176. In  $\text{S}_{\text{N}}2$  reactions, the correct order of reactivity for following compounds

- $\text{CH}_3\text{Cl}$ ,  $\text{CH}_3\text{CH}_2\text{Cl}$ ,  $(\text{CH}_3)_2\text{CHCl}$ ,  $(\text{CH}_3)_3\text{CCl}$  is  
 (1)  $\text{CH}_3\text{CH}_2\text{Cl} > \text{CH}_3\text{Cl} > (\text{CH}_3)_2\text{CHCl} > (\text{CH}_3)_3\text{CCl}$   
 (2)  $(\text{CH}_3)_2\text{CHCl} > \text{CH}_3\text{CH}_2\text{Cl} > \text{CH}_3\text{Cl} > (\text{CH}_3)_3\text{CCl}$   
 (3)  $\text{CH}_3\text{Cl} > (\text{CH}_3)_2\text{CHCl} > \text{CH}_3\text{CH}_2\text{Cl} > (\text{CH}_3)_3\text{CCl}$   
 (4)  $\text{CH}_3\text{Cl} > \text{CH}_3\text{CH}_2\text{Cl} > (\text{CH}_3)_2\text{CHCl} > (\text{CH}_3)_3\text{CCl}$

177. Which of the following compounds will give a yellow ppt with iodine and alkali

- (1) Acetamide (2) 3-Hydroxypentane  
 (3) Acetophenone (4) Methyl acetate

178. Which of the following undergoes fastest reaction with aqueous  $\text{NaOH}$  solution

- (1)  $\text{C}_6\text{H}_5 - \underset{\text{Cl}}{\text{CH}} - \text{OMe}$   
 (2)  $\text{C}_6\text{H}_5 - \underset{\text{Cl}}{\text{CH}} - \text{CH}_3$   
 (3)  $\text{C}_6\text{H}_5 - \underset{\text{Cl}}{\text{CH}} - \text{CH}_2\text{CH}_3$   
 (4)  $\text{C}_6\text{H}_5 - \underset{\text{Cl}}{\text{CH}} - \text{C}_6\text{H}_5$

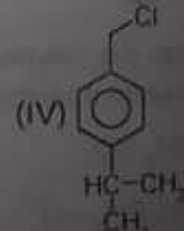
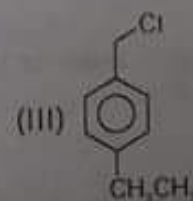
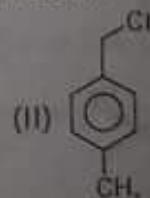
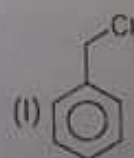
179. Which of the following intermediate is formed in Reimer-Tiemann reaction?

- (1) Carbocation (2) Carbanion  
 (3) Carbene (4) Free radical

180. Which of the following statement is not correct for nucleophilic substitution reaction?

- (1) correct decreasing order for  $\text{S}_{\text{N}}1$  reactivity is  $(\text{CH}_3)_3\text{CCl} > (\text{CH}_3)_2\text{CHCl} > \text{CH}_3\text{CH}_2\text{Cl}$   
 (2) Stereochemical inversion occurs in  $\text{S}_{\text{N}}2$  reaction  
 (3) Racemisation occurs in  $\text{S}_{\text{N}}1$  reaction  
 (4) Carbocation is formed during  $\text{S}_{\text{N}}2$  reaction

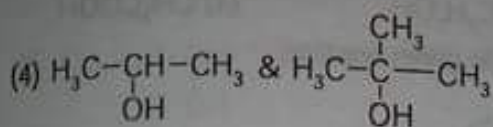
181. Reactivity order for  $\text{S}_{\text{N}}1$  reaction



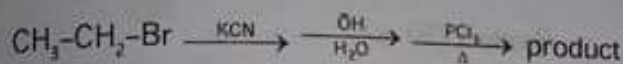
- (1)  $I > II > III > IV$  (2)  $II > III > IV > I$   
 (3)  $IV > III > II > I$  (4)  $III > IV > II > I$

182. A set of two organic compound can be distinguished by iodoform test from each other set of compound may not be

- (1)  $\text{CH}_3\text{-CH}_2\text{-OH}$  &  $\text{CH}_3\text{-OH}$
- (2)  $\text{CH}_3\text{COCH}_3$  &  $\text{PhCOCH}_3$
- (3)  $\text{CH}_3\text{CHO}$  &  $\text{HCHO}$

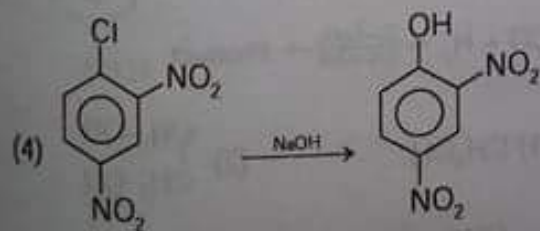
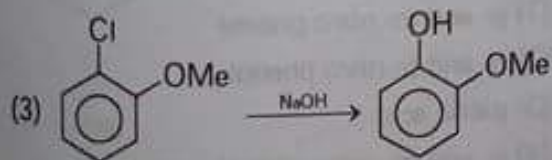
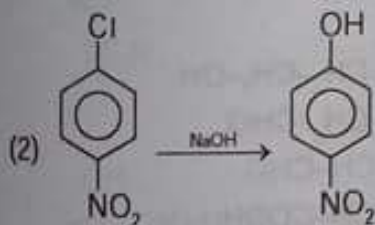
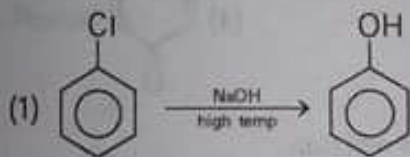


183. Major product of the following reaction



- (1)  $\text{CH}_3\text{-CH}_2\text{-Cl}$
- (2)  $\text{H}_3\text{C}-\text{CH}_2-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{Cl}$
- (3)  $\text{CH}_3\text{-CH}_2\text{-CN}$
- (4)  $\text{CH}_3-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{NH}_2$

184. Which reaction is least feasible

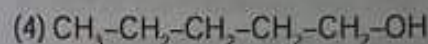
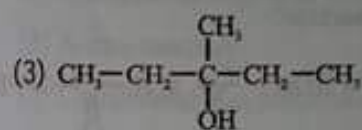
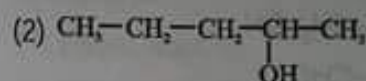
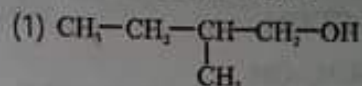


## OXYGEN CONTAINING COMPOUND-I

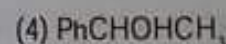
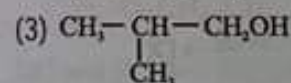
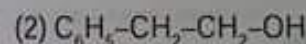
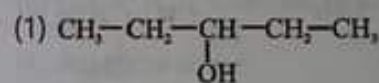
185. An ether is more volatile than alcohol having the same molecular formula this is due to:-

- (1) Inter molecular H-bonding in ether's
- (2) Inter molecular H-bonding in alcohols
- (3) Dipolar character of ether's
- (4) Alcohol have resonating structure

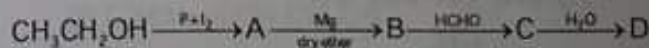
186. Among the following compounds which can be dehydrated very easily is:-



187. Among the following the one that gives positive iodoform test upon reaction with  $\text{I}_2$  and  $\text{NaOH}$  is:-



188. In the following sequence of reaction:



the compound D is :-

- (1) Butanal
- (2) n-butyl alcohol
- (3) n-propyl alcohol
- (4) propanal

189. Glycerol on treatment with oxalic acid at  $110^\circ\text{C}$  from:-

- (1) formic acid
- (2)  $\text{CO}_2$  and  $\text{CO}$
- (3) Allyl alcohol
- (4) Glycol

190. n-propyl bromide reacts with aqueous  $\text{KOH}$  to form:-

- (1) Propane
- (2) Propene
- (3) Propyne
- (4) propanol

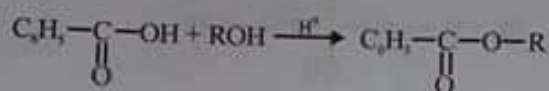
191. When phenol is treated with bromine /H<sub>2</sub>O, it gives:-

- (1) O- and p-dibromo phenol
- (2) 2, 3, 4-tribromophenol
- (3) 2, 4, 6-tribromo phenol
- (4) None

192. When CH<sub>2</sub>=CH-COOH is reduced with LiAlH<sub>4</sub>, the compound obtained will be:-

- (1) CH<sub>3</sub>-CH<sub>2</sub>-COOH
- (2) CH<sub>2</sub>=CH-CH<sub>2</sub>-OH
- (3) CH<sub>3</sub>-CH<sub>2</sub>-CH<sub>2</sub>-OH
- (4) CH<sub>3</sub>-CH<sub>2</sub>-CHO

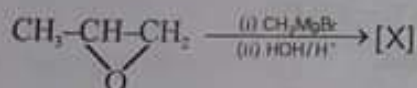
193. In the given reaction:-



Which alcohol will be most reactive

- (1) CH<sub>3</sub>-O-H
- (2) CH<sub>3</sub>-CH<sub>2</sub>-OH
- (3)  $\text{CH}_3-\underset{\text{OH}}{\text{CH}}-\text{CH}_3$
- (4)  $\text{CH}_3-\underset{\text{CH}_3}{\overset{\text{OH}}{\text{C}}}-\text{CH}_3$

194. In the given reaction :

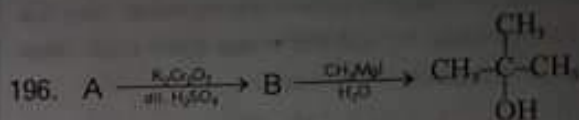


[X] will be :

- (1)  $\text{CH}_3-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_2-\text{OH}$
- (2)  $\text{CH}_3-\underset{\text{OH}}{\text{CH}}-\text{CH}_2-\text{CH}_3$
- (3)  $\text{CH}_3-\underset{\text{CH}_3}{\overset{\text{OH}}{\text{C}}}-\text{CH}_3$
- (4) CH<sub>2</sub>=CH-CH<sub>3</sub>

195. The fermentation of starch to give alcohol occurs mainly with the help of :

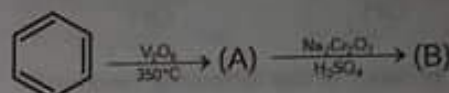
- (1) O<sub>2</sub>
- (2) Air
- (3) CO<sub>2</sub>
- (4) Enzymes



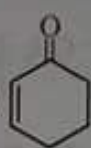
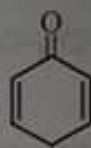
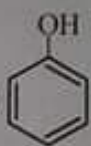

The reactant A is :

- (1) CH<sub>3</sub>CHOHCH<sub>3</sub>
- (2) CH<sub>3</sub>COCH<sub>3</sub>
- (3) C<sub>2</sub>H<sub>5</sub>OH
- (4) CH<sub>3</sub>COOH

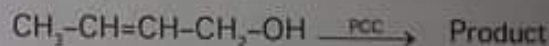
197. In the given reaction:



Product (B) is :

- (1) 
- (2) 
- (3) 
- (4) 

198. In the given reaction



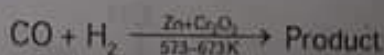
Product is :

- (1) CH<sub>3</sub>-CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-OH
- (2) CH<sub>3</sub>-CH<sub>2</sub>-CH<sub>2</sub>-CHO
- (3) CH<sub>3</sub>-CH=CH-CHO
- (4) CH<sub>3</sub>-CH=CH-COOH

199. Reaction of phenol with dil. HNO<sub>3</sub> gives :

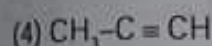
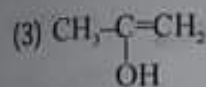
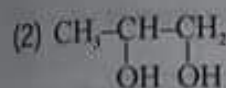
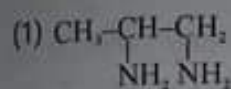
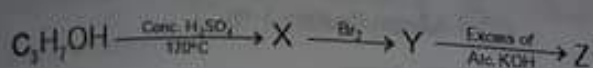
- (1) p- and m- nitro phenol
- (2) o- and p- nitro phenol
- (3) picric acid
- (4) o- and m- nitro phenol

200. In the given reaction

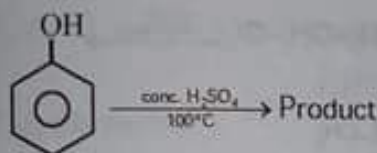


- (1) CH<sub>3</sub>OH
- (2)  $\text{CH}_2-\text{OH}$   
 $\text{CH}_2-\text{OH}$
- (3)  $\text{CHO}$   
 $\text{CHO}$
- (4)  $\text{COOH}$   
 $\text{COOH}$

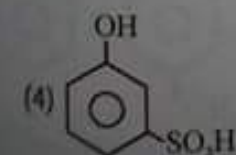
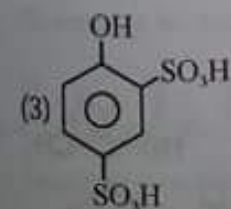
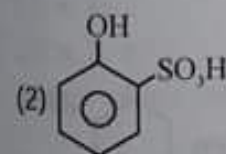
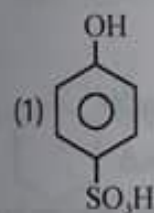
201. In the following series of chemical reaction, identify Z :



202. In following reaction sequence :



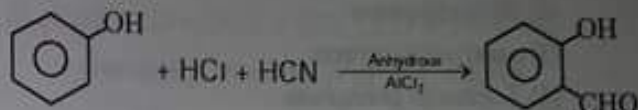
Product is :



203. Methanol and ethanol are distinguished by the :

- (1) Action of HCl
- (2) Iodoform test
- (3) Solubility of water
- (4) Sodium

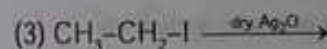
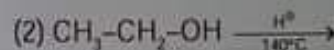
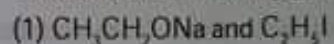
204. The following reaction :



is known as :

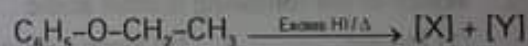
- (1) Perkin reaction
- (2) Gattermann aldehyde synthesis
- (3) Kolbe reaction
- (4) Gattermann-Koch reaction

205. Which of the following give ether ?



(4) All of the above

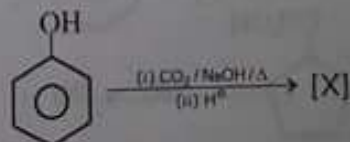
206. In the given reaction



[X] and [Y] will respectively be :

- (1)  $C_6H_5I$  and  $CH_3CH_2I$
- (2)  $C_6H_5OH$  and  $CH_3-CH_2-I$
- (3)  $C_6H_5I$  and  $CH_3CH_2OH$
- (4)  $C_6H_5OH$  and  $CH_2=CH_2$

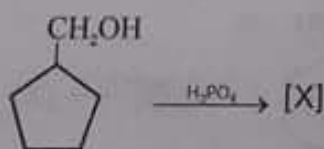
207. In the given reaction :

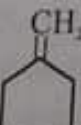
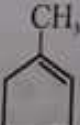
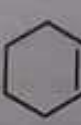
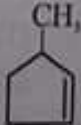


[X] will be :

- (1) Salicylic acid
- (2) p-hydroxybenzoic acid
- (3) Mixture of 1 and 2
- (4) Salicyl aldehyde

208. Rectified spirit contains :  
 (1) 94.6%  $C_2H_5OH$   
 (2) 95.6%  $C_2H_5OH$   
 (3) 96.6%  $C_2H_5OH$   
 (4) 97.6%  $C_2H_5OH$
209. Phenol reacts with  $PCl_5$  to give mainly :  
 (1) p-chlorophenol  
 (2) chlorobenzene  
 (3) o-and p-chlorophenol  
 (4) Triphenyl phosphate
210. In the given reaction  
 $CH_3-CH_2-CH_2-O-CH_2-CH_3 \xrightarrow{HCl/\Delta} [X] \text{ \& \; } [Y]$   
 [X] and [Y] respectively be ;  
 (1)  $CH_3CH_2CH_2OH$  and  $CH_3CH_2Cl$   
 (2)  $CH_3CH_2CH_2Cl$  and  $CH_3CH_2OH$   
 (3)  $CH_3CH_2CH_2Cl$  and  $CH_2=CH_2$   
 (4)  $CH_3-CH=CH_2$  and  $CH_2=CH_2$
211. Phenolphthalein is obtained from condensation between :  
 (1) Phenol and succinic acid  
 (2) Phenol and phthalic anhydride  
 (3) Phenol and succinic anhydride  
 (4) Phenol and benzaldehyde
212. Which of the following is most acidic :  
 (1) Phenol (2) Benzyl alcohol  
 (3) m-chlorophenol (4) cyclohexanol
213. Ethylene glycol on oxidation with periodic acid gives :  
 (1) Oxalic acid (2) Glyoxal  
 (3) Formaldehyde (4) Glycolic acid
214. Identify the product [X]

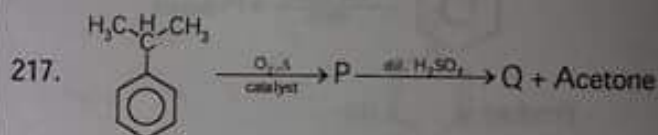
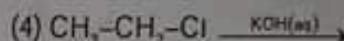
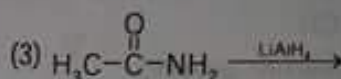
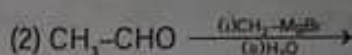
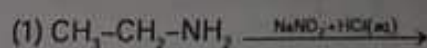


- (1)  (2)  (3)  (4) 

215. Amongst the following alcohols which would react fastest with conc.  $HCl$  and  $ZnCl_2$ ?

- (1) 2-Methylbutan-1-ol  
 (2) 2-Pentanol  
 (3) 1-Pentanol  
 (4) 2-Methyl-2-butanol

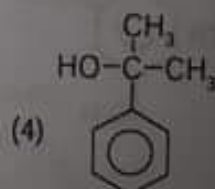
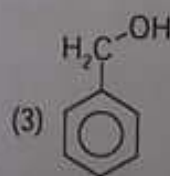
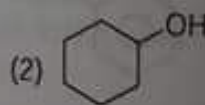
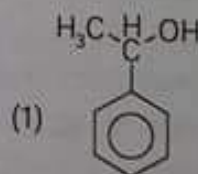
216. Alcohol is not formed as product in



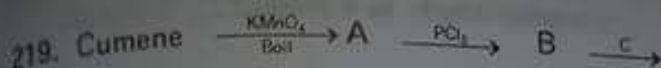
Q does not react with

- (1) Na (2) NaOH  
 (3)  $NaHCO_3$  (4)  $Zn, \Delta$

218. Minimum reactive towards dehydration in acidic medium



OXYGEN CONTAINING-II

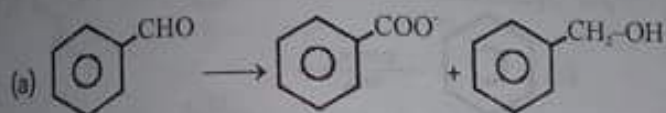


Benzaldehyde

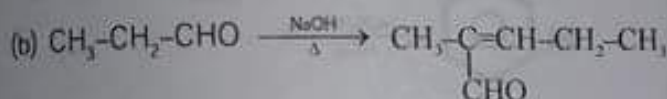
Find "C" :

- (1)  $\text{H}_2 / \text{Pd} / \text{BaSO}_4$
- (2)  $\text{CO} / \text{HCl} / \text{AlCl}_3$
- (3)  $\text{CH}_3\text{NH}_2 / \text{HCl} / \text{AlCl}_3$
- (4)  $\text{CrO}_3 / \text{Ac}_2\text{O}$

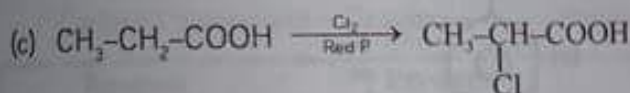
220. Which of the following correct set of name reaction :



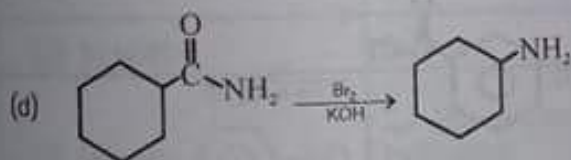
Cannizzaro reaction



Aldol condensation



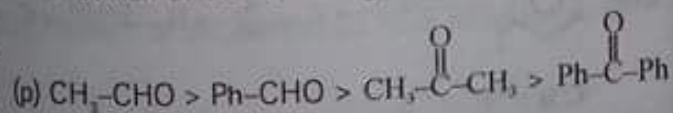
HVZ reaction



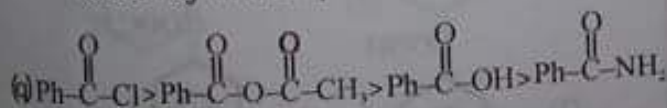
Hoffmann's bromamide

- (1) a, b
- (2) b, c
- (3) a, b, c
- (4) All

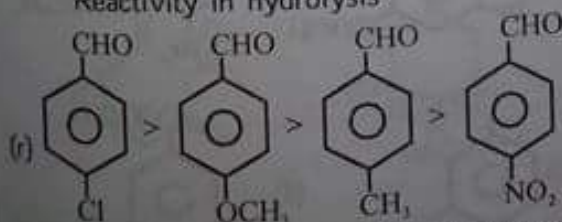
221. Which of the following is correct order :



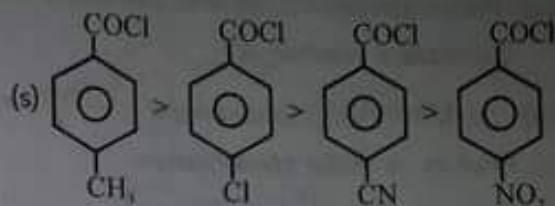
Reactivity in nucleophilic addition reaction



Reactivity in hydrolysis



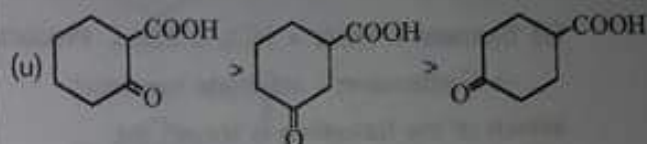
Reactivity in nucleophilic addition reaction



Reactivity in hydrolysis

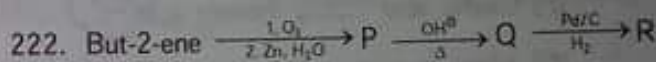


Reactivity towards Grignard reagent

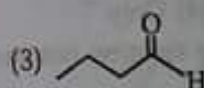
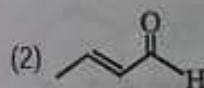


Rate of decarboxylation

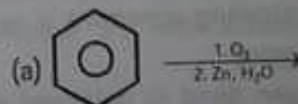
- (1) p, q
- (2) r, s, t
- (3) p, q, r, s
- (4) p, q, u



R is :



223. Glyoxal form by :



- (1) a, b, c
- (2) a, c, d
- (3) a, d
- (4) All

224. (a) Phthalaldehyde  $\xrightarrow{\text{Conc. NaOH}}$  Product  $\rightarrow$  Cannizzaro reaction

(b)  $\alpha$ -Methylcyclohexanone  $\xrightarrow[\Delta]{\text{NaOH}}$  Product  $\rightarrow$  Aldol condensation

(c) Toluene  $\xrightarrow[\text{H}_3\text{O}^+]{\text{CrO}_2\text{Cl}_2/\text{CS}_2}$  Product  $\rightarrow$  Etard reaction

(d) Benzene + CO + HCl  $\xrightarrow{\text{AlCl}_3}$  Product  $\rightarrow$  Gattermann's Koch reaction

(e) Benzene + HCN + HCl  $\xrightarrow{\text{AlCl}_3}$  Product  $\rightarrow$  Gattermann's aldehyde synthesis

Which of the following is correct set :

- (1) a, b, c, d (2) a, b, d, e  
(3) a, b, c, e (4) a, b, c, d, e

225. Which of the following is not correct reaction :

(P) Oxalic acid  $\xrightarrow{\Delta}$  Formic acid

(Q) Malonic acid  $\xrightarrow{\Delta}$  Acetic acid

(R) Succinic acid  $\xrightarrow{\Delta}$  Succinic Anhydride

(S) Adipic acid  $\xrightarrow{\Delta}$  Cyclopentanone

(T) Formic acid  $\xrightarrow{\Delta}$  CO

- (1) P, Q (2) R, S, T  
(3) P, Q, T (4) Only T

226. Which of the following reaction not involved formation of nitrene :

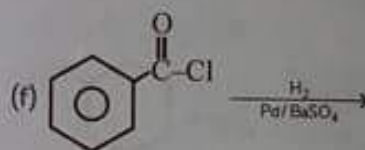
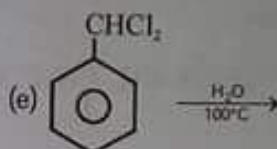
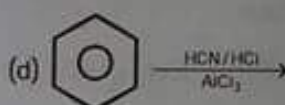
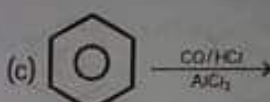
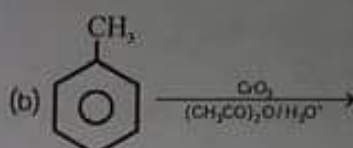
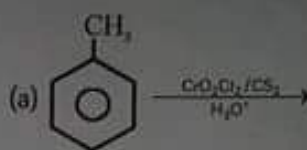
- (1) Gabriel phthalamide reaction  
(2) Schmidt reaction  
(3) Curtius reaction  
(4) Hoffmann's reaction

227. Which of the following statement is not true about carbonyl group :

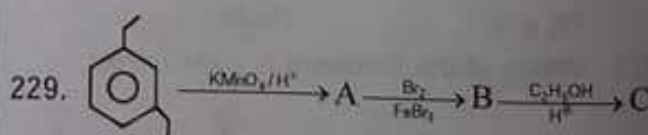
- (1) Carbon-oxygen bond is polarised due to higher electronegativity of oxygen  
(2) Carbonyl carbon is electrophilic while oxygen is nucleophilic center  
(3) Carbonyl group have more dipole moment than ether  
(4) Polarity of carbonyl group as given



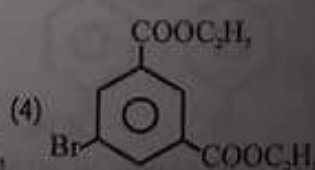
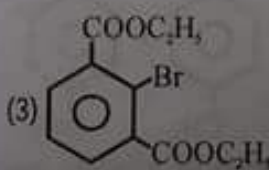
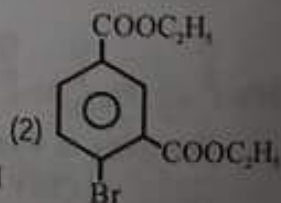
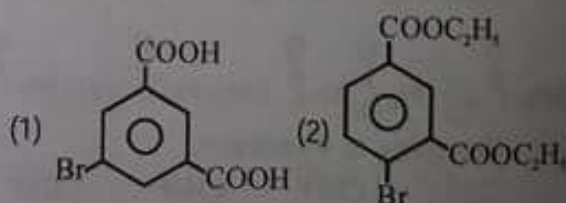
228. Which of the following reaction form benzene carbaldehyde as a product :



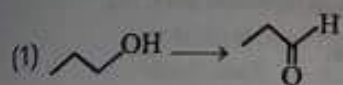
- (1) a, b, c, d (2) a, b, d, e  
(3) a, b, e, f (4) a, b, c, d, e, f



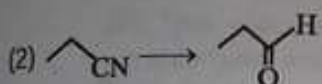
C is :



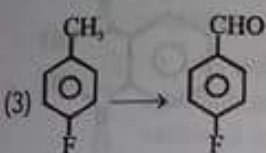
230. Which of the following is not correct matched:  
Reaction Reagent



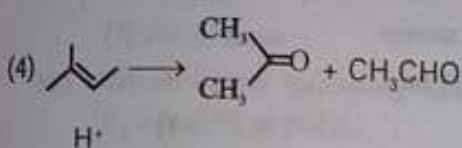
PCC



DIBAL-H



$\text{CrO}_3/\text{Ac}_2\text{O}/\text{H}_3\text{O}^+$



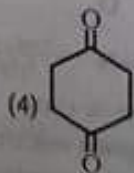
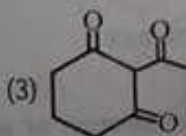
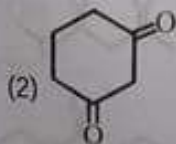
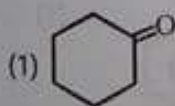
$\text{KMnO}_4/$

231. Which of the following product is not correct :

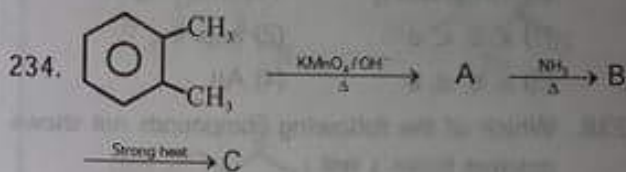
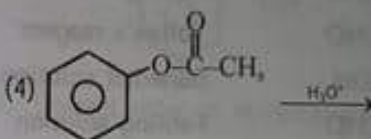
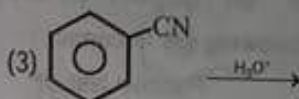
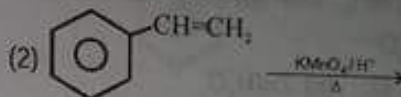
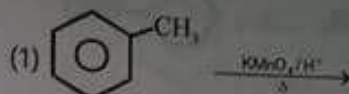
Carbonyl compound + Reagent  $\rightarrow$  Product

Reagent	Product
(1) $\text{NH}_3$	Imine
(2) $\text{NH}_2\text{OH}$	Oxime
(3) $\text{NH}_2\text{NH}-\text{C}_6\text{H}_3(\text{NO}_2)_2$	2,4-Dinitrophenyl hydrazone
(4) $\text{NH}_2-\text{C}(=\text{O})-\text{NH}_2$	Semicarbazone

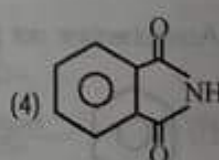
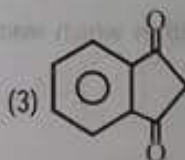
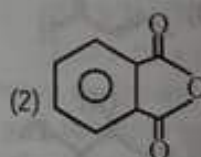
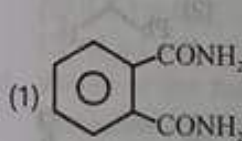
232. Which of the compound have most acidic  $\alpha\text{H}$ :



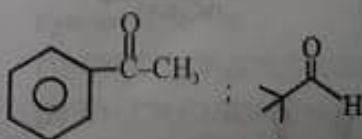
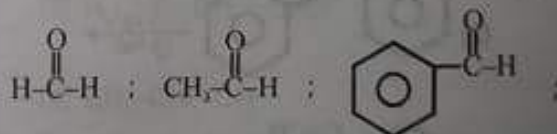
233. Benzoic acid not form in :



C is :

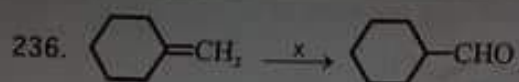


235. How many compounds gives Cannizzaro reaction and aldol condensation respectively :



(1) 3, 2  
(3) 1, 4

(2) 2, 3  
(4) 4, 1



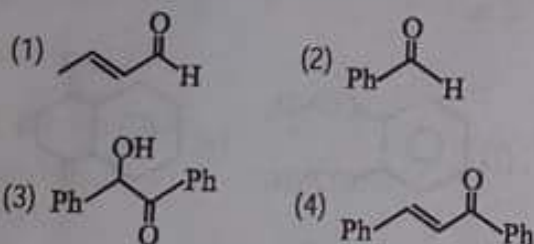
X is :

- (1) (a)  $\text{BH}_3$ , THF (b)  $\text{H}_2\text{O}_2$  /  $\text{OH}^-$   
 (2)  $\text{H}_2\text{O}^+$   
 (3) (a)  $\text{O}_3$  (b)  $\text{Zn}/\text{H}_2\text{O}$   
 (4) (a)  $\text{BH}_3/\text{THF}$  (b)  $\text{H}_2\text{O}_2/\text{OH}^-$  (c)  $\text{CrO}_3$

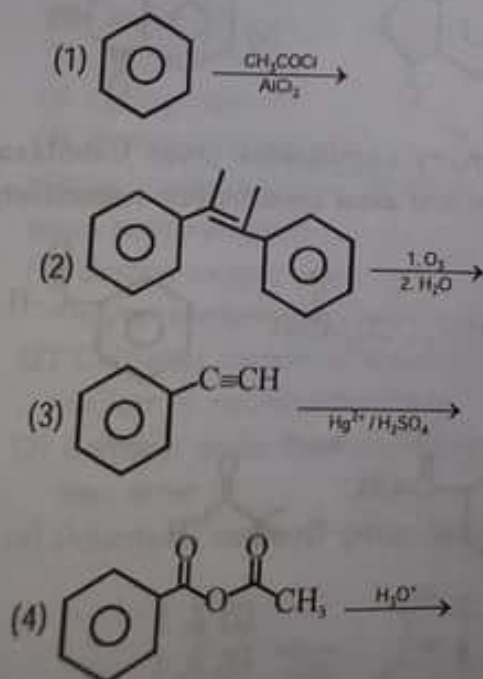
237. Which of the following set is correct :

Compound	Positive test of
(a) $\text{CH}_3\text{CHO}$	Fehling test
(b) $\text{Ph}-\text{CHO}$	Tollen's reagent
(c) $\text{HCOOH}$	Benedict solution
(d) $\text{Ph}-\text{CHO}$	Fehling solution
(e) $\text{CH}_3\text{COCH}_3$	Tollen's reagent
(1) a, b, c, d	(2) a, b, c
(3) a, b, d, e	(4) All

238. Which of the following compounds not shows positive tollen's test :

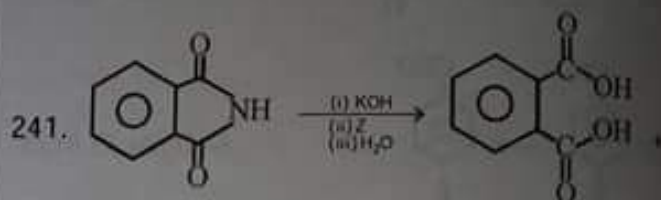


239. Acetophenone not produced in which reaction :



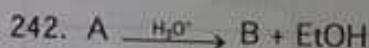
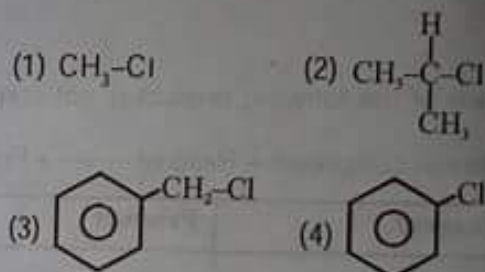
240. Which reaction shows decrease in number of carbon atoms in product :

- (1) Schmidt reaction  
 (2) Curtius reaction  
 (3) Hoffmann's reaction  
 (4) All of these



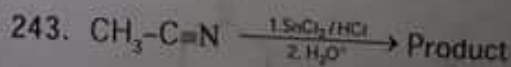
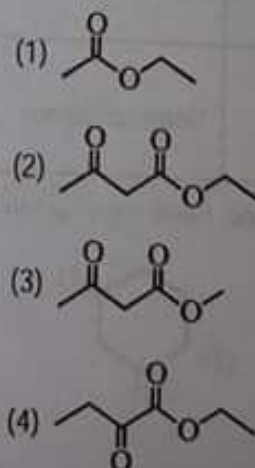
Primary amine

Z may not be :



$\text{B} \xrightarrow{\Delta} \text{Acetone}$

A is :



Reaction is called :

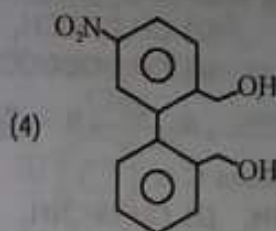
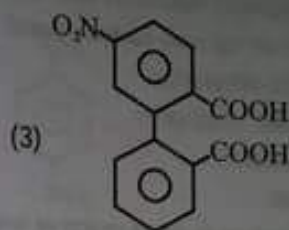
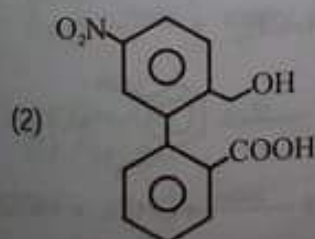
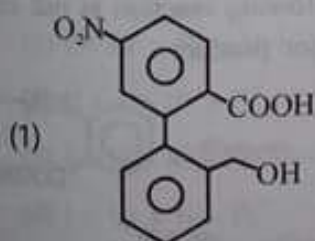
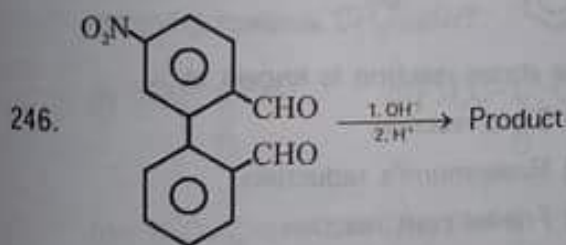
- (1) Stephen reaction for preparation of amine  
 (2) Stephen reaction for preparation of imine  
 (3) Stephen reaction for preparation of ketone  
 (4) Stephen reaction for preparation of aldehyde

244. Correct statement for nucleophilic addition of sodium bisulphate on carbonyl compounds is:

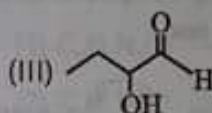
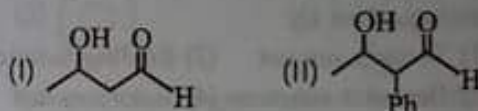
- (1) This addition is highly sensitive to crowding steric crowding increases, then addition decreases, so aldehyde more reactive than ketone in this reaction
- (2) This reaction used for separation of aldehyde and ketone from a mixture containing some other compounds because addition product is a crystalline salt
- (3) It is reversible reaction, so bisulphite addition product regenerate corresponding carbonyl compound on treatment with acid or base
- (4) All of these

245. Which of the following does not react with ( $I_2 + NaOH$ ) or NaOI :

- (1)  $CH_3-CHO$
- (2)  $CH_3-CH_2-CHO$
- (3)  $CH_3-CH_2-OH$
- (4)  $CH_3-C(=O)-CH_3$

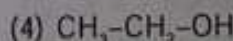
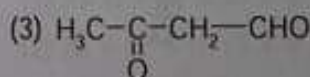
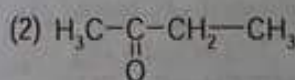
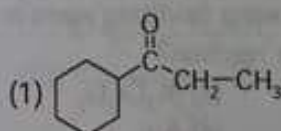


247. Correct order of dehydration of aldol :



- (1) II > I > III
- (2) I > II > III
- (3) III > I > II
- (4) II > III > I

248. Which of the following compound can form hydrazone and will give iodoform test but will not give Tollen's test?



249. Propanal on treatment with dilute sodium hydroxide forms

- (1)  $CH_3CH_2CH_2CH_2CH_2CHO$
- (2)  $CH_3CH_2CH(OH)CH_2CH_2CHO$
- (3)  $CH_3CH_2CH(OH)CH(CH_3)CHO$
- (4)  $CH_3CH_2COONa$

250. Which of the following reactions will not result in the formation of carbon-carbon bond

- (1) Friedel Craft's alkylation
- (2) Reimer Tieman reaction
- (3) Cannizzaro reaction
- (4) Wurtz reaction

251. Which of the following is most reactive towards nucleophilic attack at carbonyl group

- (1)  $\text{CH}_3\text{COCl}$  (2)  $\text{CH}_3\text{COOCH}_3$
- (3)  $\text{CH}_3\text{CONH}_2$  (4)  $\text{CH}_3\text{COOCOCH}_3$

252.  $\text{CH}_3\text{CH}_2\text{COOH} \xrightarrow{\text{SOCl}_2} \text{A} \xrightarrow[\Delta]{\text{NH}_3} \text{B} \xrightarrow[\text{KOH}]{\text{Br}_2} \text{C}$

Structure of compound C is

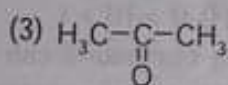
- (1)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$  (2)  $\text{CH}_3\text{CH}_2\text{NH}_2$
- (3)  $\text{CH}_3\text{CH}_2\text{NHCH}_3$  (4)  $\text{CH}_3\text{CH}_2\text{CONH}_2$

253. Acetaldehyde and benzaldehyde can not be distinguished by

- (1) Tollen's reagent (2) Fehling solution
- (3) Benedict solution (4) Iodoform test

254. Which of the following compound does not give positive Fehling's test

(1)  $\text{CH}_3\text{CHO}$



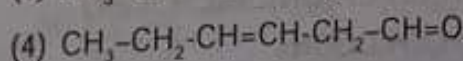
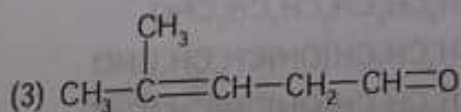
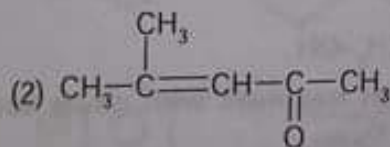
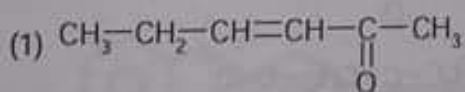
(4) 2 & 3 both

255.  $\text{RCH}_2\text{OH} \xrightarrow{[\text{O}]} \text{RCHO}$

Which of the following oxidising agent is most suitable for above reaction?

- (1) PCC (2)  $\text{K}_2\text{Cr}_2\text{O}_7$
- (3)  $\text{KMnO}_4$  (4) All

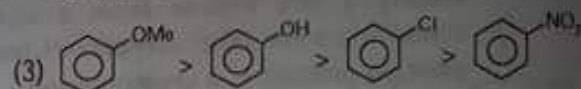
256.  $\text{CH}_3-\text{C}\equiv\text{CH} \xrightarrow[\text{Hg}^{+}]{\text{dil. H}_2\text{SO}_4} \text{X} \xrightarrow[\Delta]{\text{Ba(OH)}_2} \text{Y}; \text{Y is}$



257. Which of the following is correct for

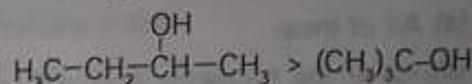
(1)  $\text{CH}_3-\text{COCl} > \text{CH}_3-\text{COOCO}-\text{CH}_3 > \text{CH}_3-\text{COC}_2\text{H}_5 > \text{CH}_3-\text{CONH}_2$   
(reactivity towards hydrolysis)

(2)  $\text{C}_6\text{H}_5-\text{CH}=\text{O} > \text{CH}_3-\text{CH}=\text{O} > \text{CH}_3-\text{CO}-\text{CH}_3$   
(reactivity towards cyanohydrine formation)



(reactivity towards electrophilic substitution reaction)

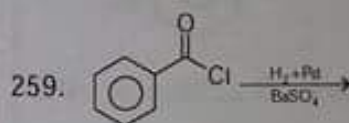
(4)  $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{OH} >$



(reactivity towards Lucas reagent)

258. Benzaldehyde and acetaldehyde can be distinguish by :

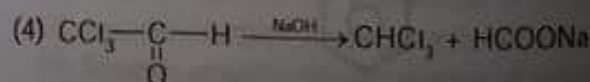
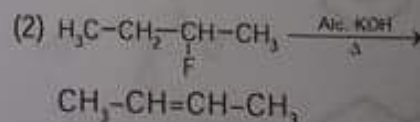
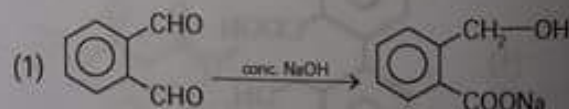
- (1) Hinsberg reagent (2) Tollen's reagent
- (3) Baeyers reagent (4) Iodoform test

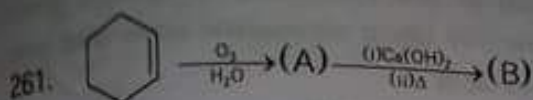


The above reaction is known as

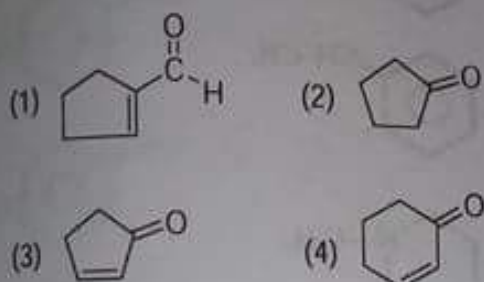
- (1) Etard reaction
- (2) Rosenmund's reduction
- (3) Friedel craft reaction
- (4) Clemmensen's reduction

260. Which of the following reaction is not correct according to major product

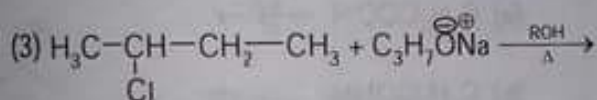
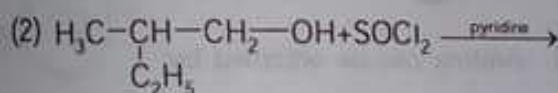
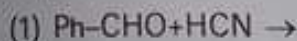




Product B is

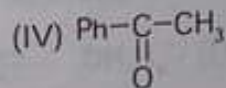
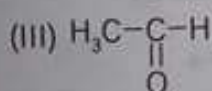
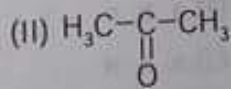
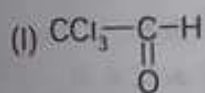


262. In which reaction racemic mixture is obtained as product?



(4) All of these

263. Arrange the following in order of their reactivity towards CH3MgBr?

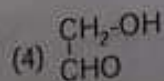
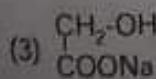
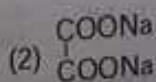
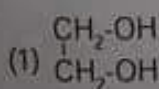
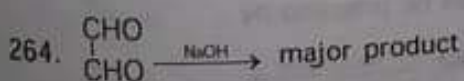


(1) I > IV > III > II

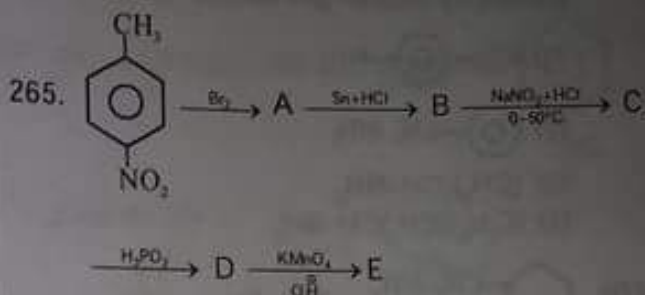
(2) II > I > III > IV

(3) I > II > III > IV

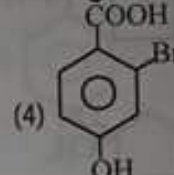
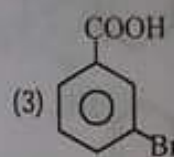
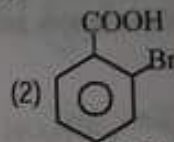
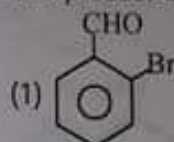
(4) I > III > II > IV



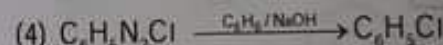
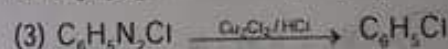
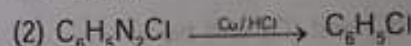
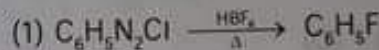
## NITROGEN CONTAINING COMPOUND



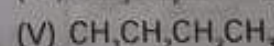
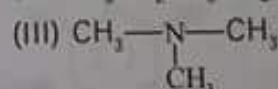
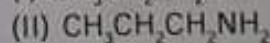
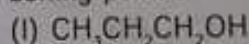
End product E will be :



266. Which is sendmeyer reaction in the followings :



267. Arrange the following in decreasing order of boiling point :



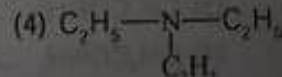
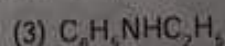
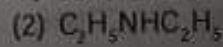
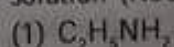
(1) I > II > IV > III > V

(2) III > IV > II > I > V

(3) I > V > II > III > IV

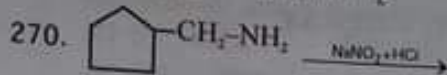
(4) II > I > III > IV > V

268. A compound reacts with Hinsberg's reagent gives a product which is soluble in alkali solution (NaOH solution) compound is :



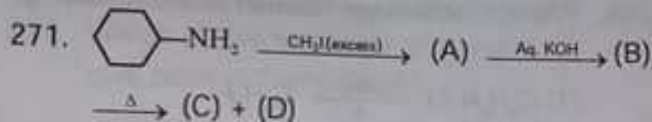
269. Which of the following compound cannot be formed by Gabriel phthalimide synthesis :

- (1)  $\text{CH}_3\text{---}\text{C}_6\text{H}_4\text{---NH}_2$
- (2)  $\text{C}_6\text{H}_5\text{---CH}_2\text{---NH}_2$
- (3)  $(\text{CH}_3)_2\text{CH---NH}_2$
- (4)  $(\text{C}_2\text{H}_5)(\text{CH}_3)\text{CH---NH}_2$



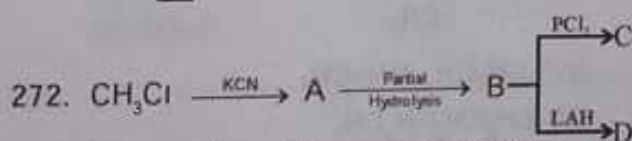
Find out major product :

- (1)
- (2)
- (3)
- (4)



Product (C) and (D) will be :

- (1) +  $(\text{CH}_3)_3\text{N}$
- (2) +  $(\text{CH}_3)_3\text{N}$
- (3) +  $\text{CH}_3\text{---OH}$
- (4) +  $\text{CH}_3\text{---OH}$



Products C and D are respectively :

- (1)  $\text{CH}_3\text{COCl}$  and  $\text{CH}_3\text{CH}_2\text{OH}$
- (2)  $\text{CH}_3\text{COCl}$  and  $\text{CH}_3\text{CH}_2\text{NH}_2$
- (3)  $\text{CH}_3\text{CN}$  and  $\text{CH}_3\text{CH}_2\text{NH}_2$
- (4)  $\text{CH}_3\text{CH}_2\text{Cl}$  and  $\text{CH}_3\text{CH}_2\text{OH}$

273. Which of the following conversion is incorrect :

- (1)  $\text{CH}_3\text{CN} \xrightarrow{\text{Na/C}_2\text{H}_5\text{OH or LAH}} \text{CH}_3\text{CH}_2\text{NH}_2$
- (2)  $\text{CH}_3\text{CONH}_2 \xrightarrow{\text{Br}_2/\text{KOH}} \text{CH}_3\text{CH}_2\text{NH}_2$
- (3)  $\text{CH}_3\text{CONH}_2 \xrightarrow{\text{NaNO}_2 + \text{HCl}} \text{CH}_3\text{COOH}$
- (4)  $\text{CH}_3\text{CONH}_2 \xrightarrow{\text{P}_2\text{O}_5} \text{CH}_3\text{CN}$

274. Which of the following compound gives yellow oily liquid nitrosamine when react with nitrous acid:

- (1)
- (2)
- (3)
- (4)

275. Aniline can be obtained by:

- (a)  $\text{C}_6\text{H}_5\text{COOH} \xrightarrow[\text{H}^+]{\text{N}_2\text{H}}$
  - (b)  $\text{C}_6\text{H}_5\text{CONH}_2 \xrightarrow[\Delta]{\text{Br}_2/\text{KOH}}$
  - (c)  $\text{C}_6\text{H}_5\text{COOH} \xrightarrow[\Delta]{\text{NH}_3}$
  - (d)  $\text{C}_6\text{H}_5\text{NO}_2 \xrightarrow{\text{Fe} + \text{H}_2\text{O}}$
- (1) a, b, c                      (2) a, b  
(3) a, b, d                      (4) a, b, c, d

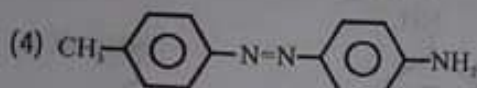
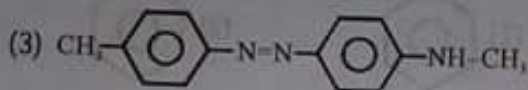
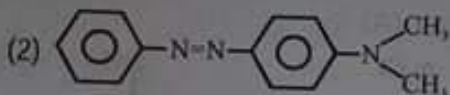
276. Aniline cannot be obtained by :

- (1)  $\text{C}_6\text{H}_5\text{NO}_2 \xrightarrow[\text{Electrolysis}]{\text{conc. H}_2\text{SO}_4}$
- (2)  $\text{C}_6\text{H}_5\text{Cl} \xrightarrow[\Delta]{\text{NaNH}_2}$
- (3)  $\text{C}_6\text{H}_5\text{COCl} \xrightarrow[\text{(KOH)}]{\text{NaI}}$
- (4)  $\text{C}_6\text{H}_5\text{OH} \xrightarrow[\text{Dry ZnCl}_2]{\text{NH}_3}$

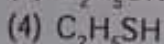
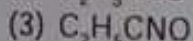
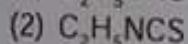
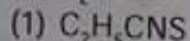
277. Aniline can be prepared by :

- (1)  $\text{C}_6\text{H}_5\text{NO}_2 \xrightarrow{\text{SnCl}_2 + \text{NaOH}}$
- (2)  $\text{C}_6\text{H}_5\text{NO}_2 \xrightarrow[\text{Electrolysis}]{\text{Dil. H}_2\text{SO}_4}$
- (3)  $\text{C}_6\text{H}_5\text{NO}_2 \xrightarrow{\text{Aq. sodium arsenite}}$
- (4)  $\text{C}_6\text{H}_5\text{NO}_2 \xrightarrow{\text{Zn} + \text{NaOH (H}_2\text{O)}}$

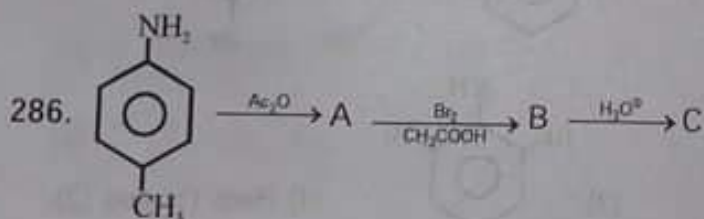
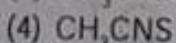
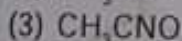
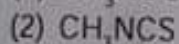
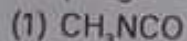
283. Aniline  $\xrightarrow[0-5^\circ\text{C}]{\text{NaNO}_2 + \text{HCl}}$  X  $\xrightarrow{\text{N,N-Dimethylaniline}}$  Y (a coloured product)  
The structure of Y would be :



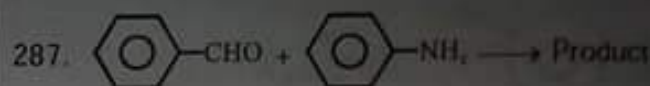
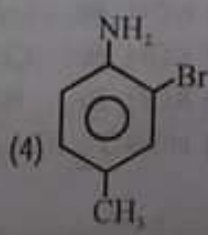
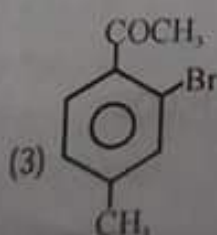
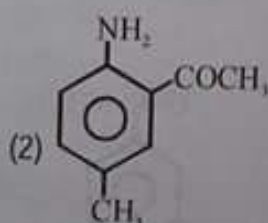
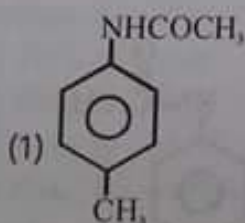
284. Ethylamine on heating with  $\text{CS}_2$  in presence of  $\text{HgCl}_2$  forms :



285. Leakage of which gas was responsible for the Bhopal gas tragedy in 1984 :



would be :



Product A is called :

(1) Azo dye

(2) Schiff reagent

(3) Schiff base

(4) Glyptal (a polymer)

288. Benzoylation reaction of  $-\text{NH}_2$  group is known as :

(1) Balz-Schumann's reaction

(2) Schotten-Baumann's reaction

(3) Gabriel phthalimide reaction

(4) Friedal craft reaction

289. Aryl fluoride may be prepared from arene diazonium chloride using

(1)  $\text{CuF}/\text{HF}$

(2)  $\text{Cu}/\text{HF}$

(3)  $\text{HBF}_4/\Delta$

(4)  $\text{HBF}_4/\text{NaNO}_2, \text{Cu}$

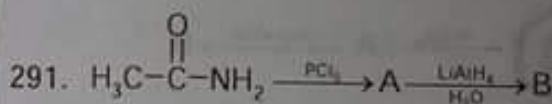
290. On heating an aliphatic primary amine with chloroform and ethanolic  $\text{KOH}$ , the organic compound formed is

(1) an alkyl cyanide

(2) an alkyl isocyanide

(3) an alkanol

(4) an alkanediol



Final product B is

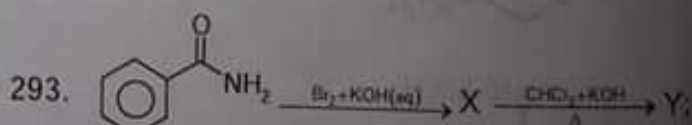
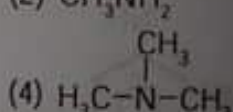
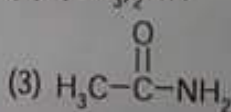
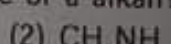
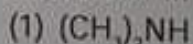
(1) A primary alcohol

(2) A primary amine

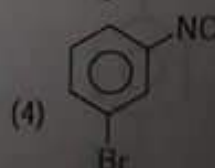
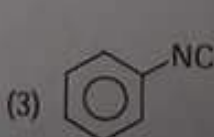
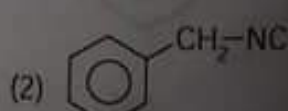
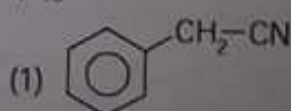
(3) A secondary amine

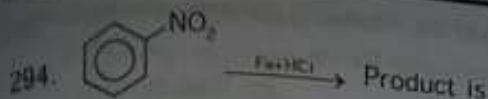
(4) A carboxylic acid

292. Which of the following compound gives a product with foul smell when reacted with chloroform in presence of an alkali?



Y is

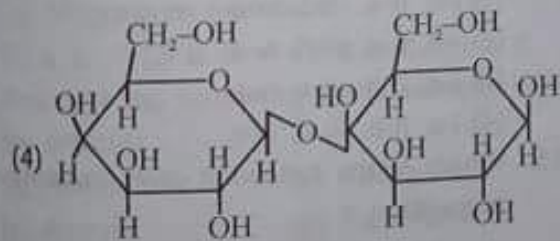
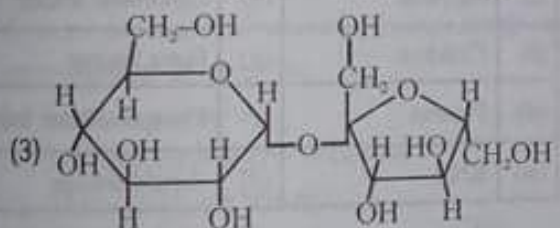
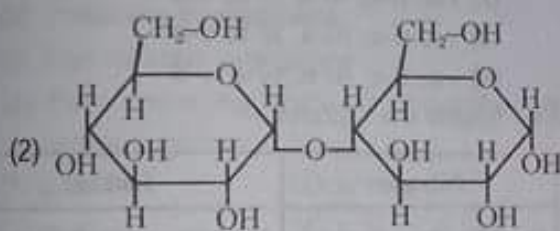
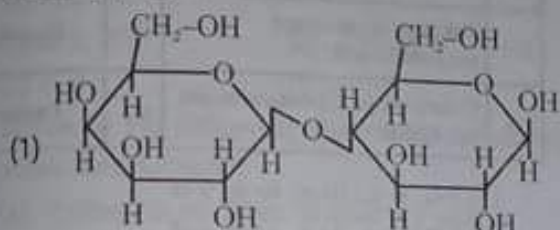




- (1) Phenyl hydroxylamine
- (2) p-amino phenol
- (3) azoxybenzene
- (4) aniline

**BIOMOLECULE, POLYMERS  
AND EVERYDAY LIFE**

295. In disaccharide, if the reducing group of monosaccharide aldehyde or ketonic groups are bonded, these are non-reducing sugars. Which of the following disaccharide is a non-reducing sugar :



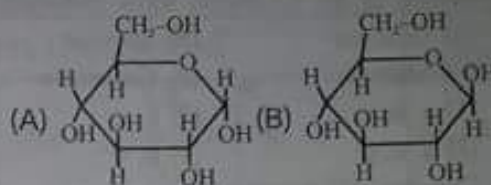
296. Lysine,  $\text{H}_2\text{N}-(\text{CH}_2)_4-\text{CH}(\text{NH}_2)-\text{COOH}$  is :

- (a)  $\alpha$ -amino acid
  - (b) Basic amino acid
  - (c) Amino acid synthesis in body
  - (d)  $\beta$ -Amino acid
- (1) a, b, c                      (2) b, c  
(3) b, d                        (4) a, b

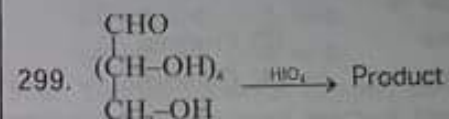
297. Which of the following reaction of glucose can be explained only by its cyclic structure :

- (1) Glucose forms pentaacetate
- (2) Glucose reacts with hydroxylamine to form an oxime
- (3) Pentaacetate of glucose does not react with hydroxylamine
- (4) Glucose is oxidised by Bromine water to gluconic acid

298. Relation between (A) and (B) is :



- (1) Epimers                      (2) Anomers
- (3) Positional isomers      (4) Functional isomers



- (1) 5 HCHO + HCOOH
- (2) 5 HCOOH + HCHO
- (3)  $\text{CH}_3\text{COOH} + 5\text{HCHO}$
- (4)  $5\text{CH}_3\text{CHO} + \text{HCHO}$

300. Which is not correct match :

Polymer	Monomers
(1) Orion	Acrylonitrile
(2) Nylon-6,6 diamine	Hexamethylene and adipic acid
(3) Dacron	Ethylene glycol and terephthalic acid
(4) Caprolactum	Nylon-6, 10

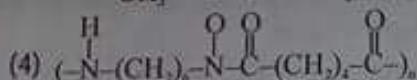
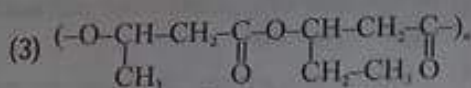
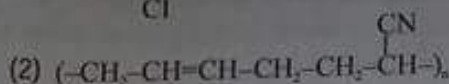
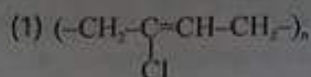
301. Buna-S is a polymer of :

- (1) Butadiene only
- (2) Buta-1, 3-diene and styrene
- (3) Styrene only
- (4) Butadiene and acrylonitrile

302. Which one of the following is not a polyamide polymers :

- (a) Nylon-6,6                      (b) Nylon-6,10
- (c) Glylptal                      (d) Dacrone
- (1) a, b                              (2) c, d
- (3) a, c                              (4) a, b, c

303. Which of the following polymer is biodegradable?



304. Which of the following show mutarotation:

- (a) Glucose (b) Sucrose  
(c) Maltose (d) Galactose  
(1) a, b, c (2) b, c  
(3) a, c, d (4) b, d

305. Glucose and mannose are :

- (1) Anomers (2) Position isomers  
(3) Functional isomers (4) Epimers

306. Invert sugar is :

- (1) Sucrose (2) Fructose  
(3) Glucose (4) Galactose

307. Glucose and fructose form identical osazones because :

- (1) they are monosaccharide  
(2) they are reducing sugar  
(3) they are epimer  
(4) their configuration differ only at C-1 and C-2

308. In purine nucleoside, C-1 of sugar form glycosidic linkage with which position of purine :

- (1) 1 (2) 2 (3) 9 (4) 8

309. Which of the following is sulphur containing amino acid :

- (a) Methionine (b) Cysteine  
(c) Leucine (d) Glutamic acid  
(1) a, b, c (2) a, b  
(3) b, c (4) c, d

310. A metal present in vitamin B-12 is:

- (1) Aluminium (2) Zinc  
(3) Iron (4) Cobalt

311. Correct statement for Bakelite is :

- (a) It is formed by phenol and formaldehyde  
(b) It is crosslinked polymer  
(c) It is thermosetting plastic  
(d) It is natural polymer  
(1) a, d (2) a, b, c (3) a, b, d (4) c, d

312. Which of the following polymers can have strong intermolecular forces :

- (a) Nylon (b) Dacron  
(c) Rubber (d) Polyester  
(1) a, b (2) a, d  
(3) a, b, d (4) b, c, d

313. Match the column :

Polymer		Commercial name	
(i)	Polyester of glycol and phthalic acid	(a)	Novolac
(ii)	Copolymer of 1,3-butadiene and styrene	(b)	Glyptal
(iii)	Phenol and formaldehyde resins	(c)	Buna-S
(iv)	Polyester of glycol and terephthalic acid	(d)	Buna-N
(v)	Copolymer of 1,3-butadiene and acrylonitrile	(e)	Dacron

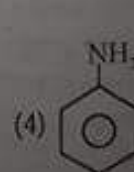
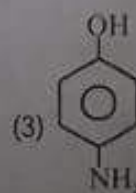
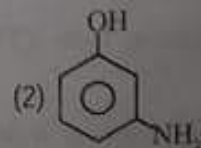
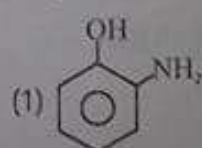
- (1) i-b, ii-c, iii-e, iv-a, v-d  
(2) i-b, ii-c, iii-a, iv-e, v-d  
(3) i-e, ii-c, iii-a, iv-b, v-d  
(4) i-e, ii-c, iii-b, iv-a, v-d

314. Match the column :

Polymer		Linkage	
(i)	Terylene	(a)	Glycosidic linkage
(ii)	Cellulose	(b)	Ester linkage
(iii)	Protein	(c)	Phosphodiester linkage
(iv)	RNA	(d)	Amide linkage

- (1) i-b, ii-a, iii-c, iv-d  
(2) i-b, ii-a, iii-d, iv-c  
(3) i-d, ii-b, iii-a, iv-c  
(4) i-a, ii-b, iii-d, iv-c

315. Which of the following gives paracetamol on acetylation :



316. Aspirin is chemically :  
 (1) Methyl benzoate  
 (2) Ethyl salicylate  
 (3) Acetyl salicylic acid  
 (4) o-hydroxy benzoic acid
317. Artificial sweetner which is stable under cold conditions only is :  
 (1) Saccharine (2) Sucrolose  
 (3) Aspartame (4) Alitame
318. Which of the following is food preservatives :  
 (a) Salt of sorbic acid  
 (b) Sodium benzoate  
 (c) Ethyl benzoate  
 (d) Alcohol  
 (1) a, b, d (2) a, b, c  
 (3) c, d (4) a, d
319. Which of the following statements are correct about barbiturates :  
 (a) Hypnotics or sleep producing agents  
 (b) These are tranquilizers  
 (c) Non-narcotic analgesics  
 (d) Pain reducing without disturbing the nervous system  
 (1) a, b (2) a, b, c  
 (3) b, c (4) c, d
320. Which of the following compounds are administered as antacids :  
 (a) Sodium carbonate  
 (b) Sodium hydrogen carbonate  
 (c) Aluminium carbonate  
 (d) Magnesium hydroxide  
 (1) a, b (2) b, d (3) a, b, c (4) c, d
321. Amongst the following antihistamines which are antacids :  
 (a) Ranitidine (b) Cimetidine  
 (c) Asprine (d) Paracetamol  
 (1) a, b (2) a, b, c (3) b, c (4) c, d
322. Veronal and luminal are derivatives of barbituric acid which are :  
 (a) Tranquilizers  
 (b) Non-narcotic analgesic  
 (c) Antiallergic drugs  
 (d) Neurologically active drugs  
 (1) a, d (2) a, b (3) a, c (4) b, c

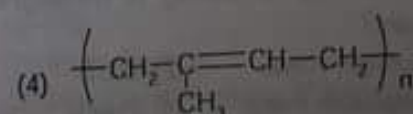
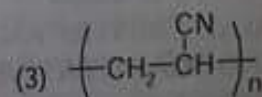
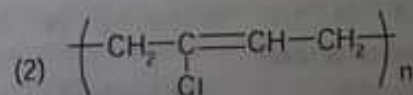
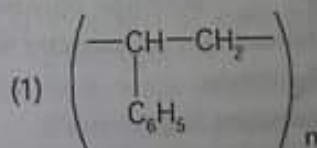
323. Bithional is generally added to soaps as an additive to function as an :  
 (1) Dryer (2) Antiseptic  
 (3) Softner (4) Antibiotic

324. Match the column :

Column-I Structure	Column-II Type of detergents
(i) $\text{CH}_3(\text{CH}_2)_{11}\text{COO}(\text{CH}_2\text{CH}_2\text{O})_3\text{CH}_2\text{CH}_2\text{OH}$	(a) Cationic detergent
(ii) $\text{C}_{17}\text{H}_{35}\text{COO}^-\text{Na}^+$	(b) Anionic detergent
(iii) $\text{CH}_3(\text{CH}_2)_{11}\text{CH}_2\text{SO}_3^-\text{Na}^+$	(c) Nonionic detergent
(iv) $\left[ \text{CH}_3(\text{CH}_2)_{11}\text{N}^+(\text{CH}_3)_3 \right] \text{Br}^-$	(d) Soap

- (1) i-a, ii-b, iii-c, iv-d  
 (2) i-a, ii-b, iii-d, iv-c  
 (3) i-c, ii-d, iii-b, iv-a  
 (4) i-c, ii-d, iii-a, iv-b

325. The species which can best serve as an initiator for the cationic polymerisation is  
 (1)  $\text{HNO}_3$  (2)  $\text{AlCl}_3$  (3)  $\text{BuLi}$  (4)  $\text{LiAlH}_4$
326. Which artificial sweetner contains chlorine?  
 (1) Aspartame (2) Saccharin  
 (3) Sucralose (4) Alitame
327. Which of the following structures represents Neoprene polymer



328. Which of the following hormones contains iodine  
 (1) Thyroxine (2) Insulin  
 (3) Testosterone (4) Adrenaline
329.  $\alpha$ -D-(+)-glucose and  $\beta$ -D-(+)-glucose are  
 (1) position isomers (2) anomers  
 (3) enantiomers (4) conformers
330. Glucose does not give positive test with  
 (1) 2,4-DNP (2) Tollen's reagent  
 (3) Fehling's solution (4) All
331. Which of the following pair does not show correct relationship?  
 (1) Isoprene : Natural rubber  
 (2) Nylon : Polyamide  
 (3) Nylon-6 : Adipic acid  
 (4) Ziegler Natta catalyst :  $\text{TiCl}_4 + (\text{C}_2\text{H}_5)_3\text{Al}$
332. Incorrect match is  
 (1) Nylon-6 : Caprolactum  
 (2) Buna-N : Elastomer  
 (3) Alitane : Artificial sweetener  
 (4) Antihistamine : Ranitidine
333. Correct statement for  $\alpha$ -D-glucose is  
 (1) Can show mutarotation  
 (2) Do not give 2,4-DNP test  
 (3) Show reducing property with Tollen's reagent  
 (4) All of these
334. Which of the following is not correctly matched  
 (1) Nylon-6 polyamide  
 (2) Buna-S Co-polymer  
 (3) Bakelite Thermoplastic  
 (4) Polythene Addition polymer
335. Which of the following is not correctly matched  
 (1) Antacid-Ranitidine  
 (2) Sucrose-Reducing sugar  
 (3) Antihistamine-Seldane  
 (4) Lactose-Milk sugar
336. Which of the following is not a monosaccharides?  
 (1) Glucose (2) Fructose  
 (3) Cellulose (4) D-Ribose
- ENVIRONMENTAL CHEMISTRY AND QUALITATIVE AND QUANTITATIVE ANALYSIS**
337. Which of the following is biodegradable pollutant?  
 (1) Nuclear waste (2) DDT  
 (3) Vegetable matter (4) Plastic
338. The region of atmosphere where human being live ?  
 (1) Troposphere (2) Stratosphere  
 (3) Biosphere (4) Exosphere
339. Stratosphere contains :  
 (1)  $\text{N}_2$  (2)  $\text{O}_2$   
 (3)  $\text{O}_3$  (4) All of these
340. Ozone is a toxic gas, yet its presence is essential in the atmosphere because :  
 (1) It protects from harmful UV radiation  
 (2) It protects from infrared radiation  
 (3) It maintains temperature of earth to optimum level  
 (4) It reduces poisonous gases to non-poisonous gases
341. Which of the following is not categorised as particulate pollutant ?  
 (1) Dust (2) Smoke  
 (3) Smog (4) Carbon dioxide
342. What is DDT among the following?  
 (1) Non-biodegradable pollutant  
 (2) Green house gas  
 (3) A fertilizer  
 (4) Biodegradable pollutant
343. Major contributor of global warming is:  
 (1) Carbon dioxide  
 (2) Carbon monoxide  
 (3) Methane  
 (4) Chlorofluoro carbon
344. Which of the following is not a green house gas?  
 (1)  $\text{CH}_4$  (2)  $\text{O}_3$   
 (3) CO (4)  $\text{H}_2\text{O}$  vapour
345. BOD value less than 5 ppm indicates as water sample to be :  
 (1) rich in dissolved oxygen  
 (2) poor in dissolved oxygen  
 (3) highly polluted  
 (4) not suitable for aquatic life
346. Acid rain is due to increase in atmospheric concentration of :  
 (1) Ozone and dust (2)  $\text{CO}_2$  and CO  
 (3)  $\text{SO}_2$  and CO (4)  $\text{SO}_2$  and  $\text{NO}_2$
347. Ozone in the stratosphere depleted by :  
 (1)  $\text{C}_2\text{H}_6$  (2)  $\text{CF}_2\text{Cl}_2$   
 (3)  $\text{C}_6\text{H}_6\text{Cl}_6$  (4)  $\text{C}_6\text{F}_6$

- CHEMISTRY AT A GLANCE
348. Taj Mahal is threatened by pollution from ?  
(1) Sulphur dioxide      (2) Hydrogen sulphide  
(3) Chlorine                (4) Carbon dioxide

349. Eutrophication causes reduction in :  
(1) Dissolved hydrogen  
(2) Dissolved oxygen  
(3) Dissolved salts  
(4) All of these

350. If BOD value of water is 20 ppm then what can we conclude regarding water ?  
(1) Polluted water  
(2) Less polluted water  
(3) Pure water  
(4) Highly polluted water

351. Which one of the following is not a common component of photochemical smog ?  
(1) O<sub>3</sub>                          (2) CH<sub>2</sub>=CH-CHO  
Acrolein  
(3)  $\text{CH}_3\text{-}\overset{\text{O}}{\underset{\parallel}{\text{C}}}\text{-O-O-NO}_2$       (4) CFC  
Peroxyacetyl nitrate  
(PAN)

352. Which of the following statement is false for classical smog ?  
(1) It occurs in cool, humid climate  
(2) It is composed of smoke, fog and SO<sub>2</sub>  
(3) It is reducing in nature  
(4) It is oxidising in nature

353. What is range of pH of acid rain ?  
(1) More than 5.6            (2) In between 6 to 7  
(3) Less than 5.6            (4) In between 6.5 to 7.5

354. Which of the following statements is wrong ?  
(1) Ozone can oxidise sulphur dioxide present in the atmosphere to sulphur trioxide  
(2) Chloro fluoro carbon are suppose to main cause of ozone layer depletion  
(3) Ozone is produced in upper stratosphere by action of UV rays  
(4) Ozone is not responsible for green house effect

355. Which of the following condition show polluted environment ?  
(1) Eutrophication  
(2) BOD is 4 ppm  
(3) pH of rain water is 5.6  
(4) Amount of CO<sub>2</sub> in the atmosphere is 0.03%

356. The prescribed upper limit concentration of lead in drinking water is about :  
(1) 30 ppb                      (2) 70 ppb  
(3) 50 ppb                      (4) 90 ppb

357. The consequence of global warming may be :  
(1) Increase in average temperature of earth  
(2) Melting of himalyan glaciers  
(3) Increased BOD  
(4) Both (1) and (2)

358. Which of the following statements about photochemical smog is wrong ?  
(1) Photochemical smog is formed through photochemical reaction involving solar energy  
(2) Plantation of some plants like pinus helps in controlling photochemical smog  
(3) Photochemical smog has high concentration of oxidising agent  
(4) Photochemical smog does not cause irritation to throat and eyes

359. Which of the following block delivery of oxygen to organs and tissues ?  
(1) CO      (2) CO<sub>2</sub>      (3) SO<sub>2</sub>      (4) O<sub>3</sub>

360. Blue baby syndrome is caused by excess of :  
(1) F<sup>-</sup>                              (2) NO<sub>3</sub><sup>-</sup>  
(3) Pb                             (4) SO<sub>4</sub><sup>2-</sup>

361. Green chemistry deals with study of ?  
(1) Plant physiology  
(2) Reactions involved in synthesis of chlorophyll  
(3) Synthesis of chemical compound using green light  
(4) Such ways where existing principles of chemistry can be applied in the production process with minimum pollution and deterioration of environment.

362. Which of the following are primary precursors of photochemical smog ?  
(1) CO<sub>2</sub> and PAN  
(2) NO<sub>x</sub> and hydrocarbons  
(3) O<sub>3</sub> and PAN  
(4) NO<sub>x</sub> and PAN

363. Which of the following belong to secondary air pollutant ?  
(1) CO  
(2) Hydrocarbon  
(3) Peroxyacetyl nitrate (PAN)  
(4) NO
- 107

364. In Duma's method for estimation of nitrogen 0.4 gm of an organic compound gave 60 ml of nitrogen collected at 300 K temperature and 720 mm pressure. Calculate the percentage composition of nitrogen in the compound : (Aqueous tension at 300 K = 20 mm)  
 (1) 16.72% (2) 15.93%  
 (3) 15.72% (4) 7.46%
365. Carbon and hydrogen are estimated in organic compounds by :  
 (1) Kjeldahl's method (2) Duma's method  
 (3) Liebig's method (4) Carius method
366. Lassaigne's test for the detection of nitrogen will fail in case of :  
 (1)  $\text{NH}_2\text{CONH}_2$   
 (2)  $\text{NH}_2\text{CONHNH}_2 \cdot \text{HCl}$   
 (3)  $\text{NH}_2\text{NH}_2 \cdot \text{HCl}$   
 (4)  $\text{C}_6\text{H}_5\text{NHNH}_2 \cdot 2\text{HCl}$
367. In a Lassaigne's test for sulphur in the organic compound with sodium nitroprusside solution the violet colour formed is due to :  
 (1)  $\text{Na}_4[\text{Fe}(\text{CN})_5\text{NOS}]$   
 (2)  $\text{Na}_3[\text{Fe}(\text{CN})_5\text{S}]$   
 (3)  $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NOS}]$   
 (4)  $\text{Na}_3[\text{Fe}(\text{CN})_5]$
368. During Lassaigne's test, N and S present individually in an organic compound changes into :  
 (1)  $\text{Na}_2\text{S}$  and  $\text{NaCN}$  (2)  $\text{NaSCN}$   
 (3)  $\text{Na}_2\text{SO}_4$  and  $\text{NaCN}$  (4)  $\text{Na}_2\text{S}$  and  $\text{NaCNO}$
369. The purpose of boiling sodium extract with conc.  $\text{HNO}_3$  before testing for halogen is :  
 (1) to make solution acidic  
 (2) to make solution clear  
 (3) to convert  $\text{Fe}^{+2}$  to  $\text{Fe}^{+3}$   
 (4) to convert  $\text{NaCN}$  to  $\text{HCN}$  and  $\text{Na}_2\text{S}$  to  $\text{H}_2\text{S}$  so that they do not interfere with  $\text{AgNO}_3$
370. In Duma's method and Kjeldahl's method, respectively nitrogen present is estimated as :  
 (1)  $\text{N}_2$ ,  $\text{NH}_3$  (2)  $\text{NH}_3$ ,  $\text{N}_2$   
 (3)  $\text{NO}_2$ ,  $\text{NH}_3$  (4)  $\text{N}_2$ ,  $\text{N}_2$
371. The sodium extract of an organic compound on acidified with acetic acid and addition of lead acetate solution gives a black precipitate. The organic compound contains :  
 (1) Nitrogen (2) Halogen  
 (3) Sulphur (4) Phosphorous
372. When N and S both are present in an organic compound, the sodium extract with  $\text{FeCl}_3$  gives :  
 (1) Green colour (2) Blue colour  
 (3) Yellow colour (4) Red colour
373. During Lassaigne's test nitrogen containing organic compound when fused with sodium metal forms 'X' while sulphur containing organic compound. When fused with sodium metal forms 'Y'. Then identify X and Y :  
 (1)  $\text{X} = \text{NaCN}$ ;  $\text{Y} = \text{Na}_2\text{S}$   
 (2)  $\text{X} = \text{NaNC}$ ;  $\text{Y} = \text{Na}_2\text{S}$   
 (3)  $\text{X} = \text{NaNO}_2$ ;  $\text{Y} = \text{Na}_2\text{SO}_4$   
 (4)  $\text{X} = \text{NaCN}$ ;  $\text{Y} = \text{Na}_2\text{SO}_4$
374. In Lassaigne's test, the organic compound is fused with sodium metal as to :  
 (1) Hydrolyse the compound  
 (2) Form a sodium derivative  
 (3) Burn the compound  
 (4) convert nitrogen, sulphur or halogen if present into soluble ionic sodium compound
375. Aniline is separated from aniline-water mixture by :  
 (1) Simple distillation  
 (2) Fractional distillation  
 (3) Steam distillation  
 (4) Distillation under reduced pressure
376. o-nitrophenol and p-nitrophenol are separated by :  
 (1) Steam distillation  
 (2) Simple distillation  
 (3) Fractional distillation  
 (4) Distillation under reduced pressure
377. Glycerol is separated from spent lye by :  
 (1) Steam distillation  
 (2) Vacuum distillation  
 (3) Sublimation  
 (4) Simple distillation
378. Two volatile and miscible liquids can be separated by fractional distillations into pure components under the condition when :  
 (1) They have low boiling points  
 (2) The difference in boiling point is large  
 (3) The boiling of two liquids are close to each other  
 (4) They do not form azeotropic mixture

379. A mixture contain four solid organic compound A, B, C and D. On heating only C changes from solid to vapour state directly. C can be separated from rest in the mixture by :
- Distillation
  - Sublimation
  - Fractional distillation
  - Crystallisation
380. Simple distillation technique can be used to separate ?
- Chloroform and Aniline
  - Ether and Toluene
  - Hexane and Toluene
  - All of these
381. Mixture of acetone and methyl alcohol can be separated by :
- Simple distillation
  - Fractional distillation
  - Sublimation
  - Chromatography
382. In column chromatography, the moving phase is :
- The substances that are to be separate
  - Solvent (Eluent)
  - Adsorbent
  - Mixture of eluent and substance to be separated
383. The principle involved in paper chromatography is :
- Adsorption
  - Partition
  - Solubility
  - Volatility
384. A mixture of naphthaline and benzoic acid can be separated by :
- Chromatography
  - Sublimation
  - Fractional crystallisation
  - Distillation
385. A sample of 0.5 g of an organic compound was analysed using Kjeldahl's method. The ammonia evolved was absorbed in 50 ml of 0.5 M  $H_2SO_4$ , the unused acid after neutralisation by ammonia consumed 80 ml of 0.5 NaOH. Then calculate percentage of nitrogen in organic compound :
- 28
  - 42
  - 56
  - 26
386. In Kjeldahl's method used for estimation of nitrogen, ammonia evolved from 0.6 g of sample of organic compound neutralised 20 ml of 1 N  $H_2SO_4$ . Then calculate % of nitrogen in that compound :
- 37.33
  - 46.67
  - 45.77
  - 43.33
387. In the estimation of sulphur by carius method 0.480 g of organic compound give 0.699 g of Barium sulphate. The percentage of sulphur in the compound is (Atomic masses ; Ba = 137, S = 32, O = 16)
- 15%
  - 35%
  - 20%
  - 30%
388. 1.4 g of an organic compound was digested according to Kjeldahl's method and the ammonia evolved was absorbed in 60 mL of M/10  $H_2SO_4$  solution. The excess sulphuric acid requires 20 mL of M/10 NaOH solution for neutralisation. The percentage of nitrogen in the compound is
- 3
  - 5
  - 24
  - 10
389. In Duma's method of estimation of nitrogen 0.35 g of an organic compound gave 55 ml of nitrogen collected at 300 K temp. and 715 mm pressure. The percentage of nitrogen in compound is (aqueous tension at 300 K = 15 mm)
- 15.45
  - 16.45
  - 17.45
  - 14.45

## ORGANIC CHEMISTRY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	2	2	3	4	3	3	4	3	4	2	2	23	3	2	1
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	3	4	2	2	1	2	2	1	23	3	3	4	3	4	4
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	23	1	4	4	2	3	3	2	1	2	3	2	2	4	1
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	2	2	4	2	2	2	3	1	2	2	3	2	3	3	3
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	2	3	3	3	4	2	4	2	2	3	2	4	3	3	2
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans.	3	4	3	3	3	2	2	1	3	3	2	2	3	1	1
Que.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Ans.	1	2	3	2	21	3	3	2	3	4	4	4	3	1	3
Que.	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	3	2	2	3	2	3	3	4	3	1	2	3	3	4	4
Que.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
Ans.	4	1	3	3	1	2	2	1	1	3	2	1	4	4	2
Que.	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
Ans.	4	2	3	2	3	2	3	4	4	4	3	2	2	4	1
Que.	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165
Ans.	2	4	2	2	1	4	1	4	3	3	3	3	4	4	4
Que.	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans.	4	1	2	3	3	3	2	3	2	4	4	3	1	3	4
Que.	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195
Ans.	2	2	3	3	2	3	4	3	1	4	3	2	1	2	4
Que.	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210
Ans.	1	4	3	2	1	4	1	2	2	4	2	1	2	4	1
Que.	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
Ans.	2	3	3	3	4	3	3	3	1	4	4	3	1	4	4
Que.	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
Ans.	1	4	4	4	4	4	3	4	4	1	4	2	4	4	4
Que.	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
Ans.	4	2	4	4	2	1	1	2	3	3	1	2	1	4	1
Que.	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
Ans.	2	1	4	2	2	2	1	4	3	2	3	1	1	1	2
Que.	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285
Ans.	2	3	2	2	2	1	2	4	4	2	3	2	2	2	1
Que.	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Ans.	4	3	2	3	2	2	2	3	4	3	4	3	2	2	4
Que.	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315
Ans.	2	2	3	3	4	1	4	3	2	4	2	3	2	2	3
Que.	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330
Ans.	3	3	2	1	2	1	1	2	3	2	3	2	1	2	1
Que.	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345
Ans.	3	4	4	3	2	3	3	1	4	1	4	1	1	3	1
Que.	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
Ans.	4	2	1	2	4	4	4	3	4	1	3	4	4	1	2
Que.	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375
Ans.	4	2	3	3	3	3	3	1	4	1	3	4	1	4	3
Que.	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390
Ans.	1	2	3	2	4	2	4	2	1	1	2	3	4	2	